

American Aviation

OCTOBER 8, 1956

MANAGEMENT
ENGINEERING
PRODUCTION
OPERATIONS
MAINTENANCE
EQUIPMENT

50 cents

REFERENCE COPY



CONVAIR 880
JET-LINER

Picture of your bright "jet-travel" future!

Fastest commercial airplane in the world—609 silent, vibrationless miles an hour! The Convair 880 JET-LINER will be powered by four of the world's most advanced commercial jet engines—General Electric CJ-805's. The only jet transport designed to operate from over 100 already existing airports throughout America! Big city or small, the Convair 880 JET-LINER will bring you luxurious jet-travel whether your destination is 2,000 miles away—or only 300. Soon you will travel faster, in more luxury and comfort than you've ever known before in Convair's 880—the all-new JET-LINER.

CONVAIR
GD A DIVISION OF GENERAL DYNAMICS CORPORATION



Convair 880 JET-LINER will fly first over the routes of **TWA** and **Delta**

- Lower height ... (.205" vs. .254")
- Narrower width ... (.328" vs. .400")
- Lighter weight ... (.25#/C vs. .35#/C)
- Counterbored ... (.060")

New Low-Height Counterbored Locknuts Conform with NAS Drawings

The new ESNA LHTA51 series of self-locking nuts was designed to meet the requirements of the recently released NAS679-695 drawings for low-height counterbored nuts. Intended for structural use, and developing the full tensile strength required by Spec MIL-N-25027 (ASG), they perform satisfactorily at temperatures up to 550°F. These parts have also been approved to AN-N-10 and drawings AN362 and AN366.

The LHTA51 series offers several special advantages to the designer:

Minimum envelope dimensions and weight compatible with performance to the tensile, vibration, twist-out and push-out requirements of MIL-N-25027 (ASG).

Reduced height permitting use of 160,000 psi heat treat short length NAS bolts to still further cut down weight of nut and bolt assembly.

Counterbore in the base of the nut assures that bolt threads will not be in bearing. This eliminates the weight of an extra shim in many applications.

Repeated use and reuse without loss of efficiency.

CHOOSE THE SOLUTION TO YOUR
FASTENING PROBLEM FROM A
COMPLETE LINE OF NUT SHAPES!

	One lug Floater (#8 through 5/16")
	Two lug "Fixed" anchor (#8 through 5/16")
	Two lug "Floater" (#8 through 5/16")
	Gang Channel (#8 through 5/16") <i>(and others not illustrated here)</i>

**ELASTIC STOP NUT
CORPORATION
OF AMERICA**



MAIL COUPON FOR DESIGN INFORMATION

Dept. N18-1073, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

- Spec Sheets
on New
LHTA51 Series Here is a drawing of our product.
What type of self-locking fastener
would you suggest?

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____



ARIZONA

Nothing like it under the sun

 Presenting the exciting new Fairchild F-27... an airliner in a class all by itself.

Here is propjet performance in tune with tomorrow: 280 mph cruise — 2250 mile range. Here is short-field performance ideal for local service routes. Takeoff run at gross weight only 3850 feet — landing distance at maximum gross weight only 3000 feet!

Generous in cabin capacity and pressurized comfort, the F-27 seats up to 40 passengers. Its wide panoramic windows make for magnificent views.

Economical too, the F-27 costs less to operate, even at low level, town-to-town hops. Costs less to maintain, less to buy . . . priced at \$540,000.*

* AIRLINE: PLUG IN RADIO UNITS EXTRA.
EXECUTIVE: PLUG IN RADIO UNITS
AND CABIN INTERIORS EXTRA.

FAIRCHILD
F-27 *Friendship*

THE FINEST AIRCRAFT FOR AIRLINES

CORPORATIONS AND MILITARY SERVICES

Address inquiries to: R. James Pfeiffer, Executive Director of Customer Relations, Fairchild Engine and Airplane Corporation, Hagerstown 15, Maryland



AMERICAN AVIATION

Voice of the Industry Since 1937

Editorial Offices: 1001 Vermont Ave., N.W., Washington 5, D.C., USA.
Phone Sterling 3-5400. Cable: AMERAV.
Advertising Offices: 17 East 48th Street, New York 17, N.Y., USA.
Phone Templeton 8-5446

WAYNE W. PARRISH, *Editor and Publisher*

ALBERT W. BENTZ, *Managing Editor*
ERIC BRAMLEY, *News Editor* JOSEPH S. MURPHY, *Technical Editor*

DEPARTMENT EDITORS

WILLIAM V. HENZEY, *Transport*
HENRY T. SIMMONS, *Manufacturing*
SEABROOK HULL, *Military*
KEITH SAUNDERS, *News Analysis*
ANTHONY VANDYK, *International*
FRANCIS J. KEENAN, *Legislative*
HENRY P. STEIER, *Electronics*
ERIK BERGAUST, *Missiles Science*
CHARLES SCHAEFFER, *Features*
LOIS C. PHILMUS, *Business Aircraft*
ARTHUR J. NEWFIELD, *Research Director*
FRED S. HUNTER, *West Coast*
SELIG ALTSCHUL, *Contributing Financial*
MARY L. MILLER, *Rates & Tariffs*
RICHARD SHEARIN, *Dayton*
WILLIAM H. MARTIN, *Art*
BERNARD BROWN, *Copy*
JOHN WALEN, *Production*
JEAN-MARIE RICHE, *Paris*
JAMES H. STEVENS, *London*
JEWELLE MAGARITY, *Airline Statistics*

LEONARD EISERER, *General Manager*
WILLIAM H. PEARSON, *Director of Advertising*

BUSINESS OFFICE

Larry Brettner, Manager, Publication Sales; Geneva C. Kinnaird, Circulation Fulfillment Manager; Ellen P. Coakley, Advertising Service Manager.

REGIONAL OFFICES

New York City: 17 East 48th St., New York 17, N.Y. William H. Pearson, director of advertising; Edward D. Muhrfeld, assistant director of advertising; M. Michael Cerick, Paul Kinney, and Robert Weston, regional advertising managers. Phone: TEMpleton 8-5446.

West Coast: 8943 Wilshire Boulevard, Beverly Hills, Calif. Fred S. Hunter, manager; John Bell, Jr., regional advertising manager. Phone: Bradshaw 2-6561, and Crestview 6-6605.

Chicago: 139 N. Clark St., Chicago 2, Ill. Laurie S. Seward, regional advertising manager. Phone: Central 6-5804.

Detroit: 509 Stephenson Bldg., Detroit 2, Mich. Phone TRinity 5-2555.

London: The AAP Company, 17 Drayton Road, Boreham Wood, Hertfordshire, England. Phone: ELStree 2688. Cable Address: STEVAIR, London.

Paris: Jean-Marie Riche, 11 Rue Condorcet, Paris (9e) France. Phone: TRU 15-39.

PUBLISHING INFORMATION

Published: Every other Monday by American Aviation Publications Inc., Washington, D.C. Printed at The Telegraph Press, Harrisburg, Pa. Entered as Second Class Matter in Washington and Harrisburg.

Subscription Rates: For U.S. and Canada-\$5.00 for 1 year; \$8.00 for 2 years. Other countries-\$7.00 for 1 year; \$12.00 for 2 years. Subscription limited to aviation industry personnel.

Incorporates: Airports and Air Carriers; Aviation Equipment, The American Pilot; Aviation Sales & Service; U.S. Aviation; and American Airports. All rights to these names are reserved.

Change of Address: Send old address (exactly as it appears on mailing label on your copy of magazine) and new address, including zone number if any, to American Aviation, 1001 Vermont Avenue, N.W., Washington 5, D.C. Allow two weeks for changeover.

PUBLISHING CORPORATION

American Aviation Publications Inc.: Principal offices at 1001 Vermont Ave., N.W., Washington 5, D.C. Wayne W. Parrish, president; Leonard Eiserer, executive vice president and general manager; William H. Pearson, vice president and director of advertising; Albert H. Stackpole and Eric Bramley, vice presidents; E. J. Stackpole, Jr., secretary.

OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily News service for the entire industry. \$200 per year. Managing Editor—Keith Saunders.

American Aviation World-Wide Directory: Twice-yearly listing of products, people, and organizations. \$9.00 each (U.S.A. and Canada); \$10.00 each Overseas. Managing Editor—Marion E. Grambow.

Official Airlines Guide: Monthly publication of airline schedules, fares, World-Wide Edition: \$19.50 per year, everywhere, North American Edition: \$13.50 per year in USA; \$14.00 in Canada; \$15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert R. Parrish.

Missiles and Rockets: Magazine of World Astronautics. For those in missiles and rocket industry and satellite science. \$8.00 for 1 year; \$12.00 for 2 years (U.S.A. and Canada); Overseas—\$9.00 for 1 year; \$14.00 for 2 years.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. \$200 per year. Managing Editor—Mary Miller.

Airports: Weekly newsletter for airport officials suppliers, and services. Airmailed every Friday, \$25 per year. Managing Editor—Lois C. Philmus.

Air Information Divisions: 595 Broad Avenue, Ridgefield, N.J. Phone: Whitney 5-8850. Director—Edward H. Henkler.

Who's Who in World Aviation: First Edition Over 2,000 biographies of aviation's leaders. 345 pp. Deluxe bound. \$10.00 per copy, postpaid.

Copyright 1956 by American Aviation Publications, Inc.

BPA

NBP

Contents

OCTOBER 8, 1956

VOL. 20

NO. 10

52,000 copies of this issue printed

INDUSTRY ROUNDUP

Common System Pattern Takes Shape	25
Russian Deltas are Good	27
There are Many Satellite Projects	30
101st Airborne: A Test for Mobility	32
What Labor Asks of Aircraft Industry	36

ELECTRONICS

How Collins Anti-Collision System Works	39
---	----

BUSINESS FLYING

Details on National's NA-75	55
Duster Sprayer Biplane	55
New SAC Business Flying Center	55
Full Parts Support for R-985	52

TRANSPORT

Time-Limit Ticketing Cuts Red Tape	61
Lockheed Begins Electra Production	61
Airfreight Forwards Continue Growth	63
LCA Employees Win in Court	67

DEPARTMENTS

Personal View	7
Washington Report	11
When & Where	12
Industry News Digest	14
Production Spotlight	19
Letters	20
Books	20
Airtrends	22
Maintenance Bulletin Board	45
New Products	46
People	53
West Coast Talk	54
International Aviation	55
Transport Trends	57
Airline Commentary	70
Employment Section	72
En Route	73

PHOTO CREDITS:

James H. Stevens, p. 25, 26, 56, 75	
Wide World, p. 28; Aircraft Armament, p. 36; Aero Design, p. 51; Lockheed p. 44	
Circle No. 2 on Reader Service Card. →	

4 Circle No. 2 on Reader Service Card. →
AMERICAN AVIATION



The new TURBO-PROP VICKERS VANGUARD

CRUIISING SPEEDS TO 425 MPH. The Vickers Vanguard, which will be available for service in 1960, will be the fastest passenger airplane in Vickers-Armstrongs history.

MORE ROOM FOR FREIGHT. Because of its "double deck" fuselage, the Vanguard can provide 1400 cubic feet of cargo capacity—the largest under-floor freight space of any airliner.

DESIGNED FOR RANGES TO 2,500 MILES. The turbo-prop Vickers Vanguard will be the ideal airplane for high density routes—medium and long ranges. True to the great performance traditions of the Vickers Viscount, the Vanguard has been designed for outstanding economy of operation.

GREATER PASSENGER CAPACITY. The Vickers Vanguard can carry 93 passengers.

U.S. Representative: Christopher Clarkson
Rockefeller Plaza, N.Y. 20, N.Y.

**turbo-prop VICKERS
VANGUARD**

POWERED BY FOUR ROLLS-ROYCE TYNE ENGINES

C-130 HERCULES

PARADROPS HEAVIEST
LOAD EVER DROPPED
FROM AN AIRPLANE

A 27,000-pound load—the heaviest single load ever extracted by parachute from an airplane—was paradropped from the U.S. Air Force's new medium troop-and-cargo carrier, C-130 HERCULES, during recent aerial delivery tests.

Soon to enter active service with the 18th Air Force of the Tactical Air Command, the C-130 HERCULES made its record-breaking drop with a 27,000-pound load of iron—from an altitude of 2,000 feet. During the same series of tests, this new "strongman" of the USAF also established new all-time records for multiple-equipment drops from any type aircraft. Sample combination drop: 19,000-pound road grader and 7,500-pound 40-mm-gun mount. Heaviest multiple drop: 18 containers totaling 29,000 pounds.

Capable of flying cargo and men farther, faster and at lower cost than any other present-day transport, the C-130 HERCULES is now being manufactured in quantity at USAF Plant No. 6, Marietta, Georgia.



Challenging opportunities in aircraft and nuclear work are available for outstanding scientists and engineers. Inquiries invited.

LOCKHEED
AIRCRAFT CORPORATION

*Georgia Division, Marietta
Look to Lockheed for Leadership*



And It Was All Going So Well

The Civil Aeronautics Board has thrown a king-size monkey wrench into the machinery for setting up technical rules for the safe operation of jet transport aircraft.

Already overburdened with the heaviest workload of cases and investigations in its history, CAB has barged into a technical arena in which it isn't qualified to the slightest degree.

CAB is the agency created to be the air regulatory judge. By its current actions, it has gotten off the judicial bench and is actively mixed up in preparing the case which it must ultimately judge.

The five non-technical members of the Board have been sold a bill of goods by the agency's own Bureau of Safety Regulations. By being so victimized, the CAB has put a roadblock in the way of what started out to be a smooth debut of jet transport operations a few years hence.

Reduced to simplest terms, the present muddle has to do with that multitude of complex but extremely vital rules that spell out the safe levels of performance for transport aircraft, in this instance the turbojets to be operated by all of the trunk carriers.

Up until recently, everything was going along just fine. The Civil Aeronautics Administration was proceeding sensibly along the same lines which it followed most successfully when it certificated the turboprop Viscount for Capital Airlines. At that time it established a jet team and it set about to study and line up all those special requirements which turboprops required over and above the rules for piston-engined types.

A year ago, when trunk carriers began ordering turbojets, CAA set in motion a series of conferences with airlines and manufacturers to line up all needed new requirements. Four months ago everyone was in agreement for the first stage. The second stage would be reached when the turbojets were ready for flight testing about 1958. Both airlines and manufacturers were clear on what was expected of them. Both groups could plan ahead.

And then—whammo!

All of a sudden the CAB's Bureau of Safety Regulation, by one of those perfectly legal loopholes to be found in almost any Act of Congress, entered the scene with a brand new Draft Release 56-20 filled with its own ideas of rules applicable to jets.

This Draft Release 56-20 is not a gradual approach to sensible regulations based on experience, it is "the works" set up for final adoption even though jet

operations are some years away. Since turbojets haven't even reached the flight testing stage, much of the rule data is arbitrary and theoretical. All CARs to date have been erected on actual experience. But No. 56-20 was dreamed up, for reasons still obscure, by one or two gents on the CAB staff level.

With great urgency, the five non-technical members of the CAB rubber-stamped the staff demand for immediate consideration. It ordered industry comments by Oct. 15 but as we went to press this date was expected to be moved to Jan. 15. One company estimated that it would take a dozen engineers six weeks full time to come up with answers to the CAB draft release, and even then the answers would of necessity have to be largely theoretical.

Then there was the annual airworthiness review held last month by CAB. Scheduled for three days, it proved to be a farce. The CAB staff tipped its hands to its unpreparedness and inexperience by muddling through a one-day session. It expected industry to come up with answers on jet performance, but such answers don't exist at this time. The rather large delegation of foreigners at the conference were appalled, to say the least.

Why is CAB stepping down from the bench and getting mixed up with a case it must ultimately judge and approve? The answers are obscure. The main brunt of the argument is that CAA may have authority to set equivalent airworthiness standards to keep jet safety on a par with piston transports, but that no such authority exists for it to set up airline operating limitations. This is pure bureaucratic hash. But CAB makes it clear that it thinks it is time for it to take over from CAA and spell out a detailed performance code for both turboprops and turbojets.

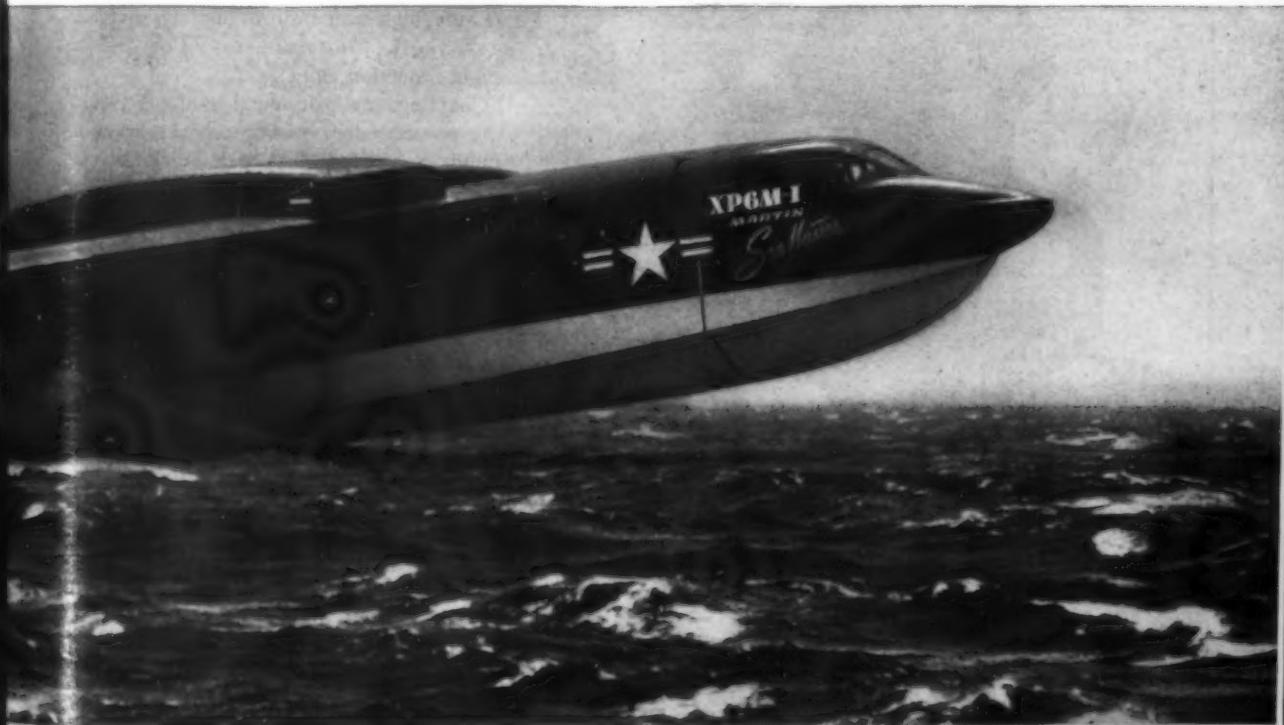
CAB Chairman Durfee is a busy man. He's still very new on the job. He can't be expected to know all of the background of such complicated matters as civil air regulations. He and his associates have taken on a workload of 17 major route cases and a half-dozen complicated major investigations, more than enough for even an experienced, competent agency.

But we would recommend to Mr. Durfee that he take time out to look into Draft Release 56-20 and how it is jamming up the machinery of an otherwise smooth program. If CAB continues to be forced into its present position by one or two ambitious staff members, the cost to airlines and manufacturers will mount. There will be many delays. And it will all have been so completely unnecessary.

P6M



This is one of the most important and exciting aircraft in the world. It is the new Martin SeaMaster, the Navy's first multi-jet attack seaplane. It is now in production and soon to be in fleet service as the spearhead of a powerful new arm of the naval arsenal—the Seaplane Striking Force. The SeaMaster's importance is a matter of inevitability: It is in the over 600 mph class, with a normal cruise altitude of 40,000 feet, an unrefueled combat radius of 1,500 miles, and is operable in "Sea State 3" (waves averaging 6 feet) with a payload of 30,000 pounds. Thus, the endless runways of this world's oceans, lakes and estuaries provide unlimited and indestructible bases for SeaMaster operation, making it the first aircraft of any type having global striking power, independent of fixed installations. *For virtually the whole of our habitable world is within flight minutes of open water!* This new aircraft development is another powerful reason why the U. S. Navy offers to the military enlistee one of the most exciting futures in the world today.



MARTIN
BALTIMORE · DENVER



Martin selected . . .



. . . Janitrol air couplings for the Navy's new P6M-1 SeaMaster, saving 75 pounds in coupling weight over the "X" version. Each SeaMaster attack seaplane uses Janitrol high-pressure, high-temperature couplings on bleed air ductwork . . . for many reasons beyond the weight reduction alone.

Couplings seal with metal-to-metal contact . . . no secondary sealing devices or compounds are needed. They're designed for continuous use at 250 psi—750°F—and can be connected and disconnected easily as often as necessary with practically no change in leakage rate. Maximum design leakage: .01 cfm per inch of duct diameter. In addition, the couplings withstand adverse conditions—corrosion, temperatures, pressures, surges, vibration, and misalignment.

Fifteen sizes available now. Write for technical information, or call your nearest Janitrol representative.

Janitrol Aircraft-Automotive Division,
Surface Combustion Corporation, Columbus
16, Ohio . . . District Engineering Offices:
Washington, D. C., Philadelphia, Columbus,
Ft. Worth, Hollywood.

COMBUSTION SYSTEMS • HEAT EXCHANGERS • PNEUMATIC CONTROLS





Washington Report

Budget Bureau Battle Shaping Up

Look for the next Congress to try to break Budget Bureau's absolute control over Administration-sponsored legislation. And the legislators will find plenty of assistance from aviation interests.

Budget has bottled up efforts to modernize existing aviation legislation and is still sitting on much proposed new legislation. During the last eight to 10 years, the bureau has gained absolute authority for coordinating new proposals with all military and civil agencies affected, as well as holding final and complete word on whether the proposals will go to Congress.

Although departmental officials cannot discuss the problem publicly, it is known that a number of proposals from CAA have been held up for years in Budget Bureau. Even comments from individual agencies on bills before Congress must be cleared with the bureau.

No Market for Taper Millers

Knowhow exists for production of 120-inch wide stainless steel tapered sheet, but AF's Air Research and Development Center apparently has made no effort to exploit it. The Waterbury, Conn., designers of the only rolling mills for fine tolerance stainless steel and titanium sheet needed by airframe and missile makers say ARDC has never discussed the problem with them, that they are totally unaware of any need or desire for such material.

Largest of their mills in the U.S. (only two now with five more on order) roll sheets only 48 inches wide, but an 80-inch mill has been operating in France for some time. None rolls tapered sheet. But, the company says, it only takes money and relatively simple modifications to go "as wide as you want" and introduce taper. The 48 inch mills with power supply cost \$1.5 million. Larger mills would be more, but probably not too much more than the AF's 120-inch tapered aluminum sheet mill at Davenport, Iowa.

Meanwhile, airframe makers, stuck with narrow sheets and no taper, are resorting to costly welded sections and laminated wing-skin construction in order to build in taper on the factory floor.

KLM in Dutch with ATA

Pointing up deterioration in U.S.-Dutch civil aviation relations were two strongly worded statements by high officials of Air Transport Assn.

Irked by repeated criticism of the U.S. government's aviation policies made by various Dutch personalities from Queen Juliana downward, ATA president Stuart Tipton said the Dutch "should be the last to complain."

"U.S. government policy has been taking care of the interests of the largely government-owned KLM Royal Dutch Airlines ever since 1946, permitting the Dutch carrier to build a worldwide network on American traffic," he said.

Tipton quoted figures showing that while American flag airlines in 1955 took \$109,000 out of Amsterdam, KLM took \$12,849,000 out of New York in the same year—a ratio of about 130 to 1.

ATA vice-president (public relations) Willis Player drew attention to KLM's "campaign of public denunciation—in the U.S. and abroad—of American policy, American flag airlines, and, in effect, the U.S. government." He referred to "emissaries swaggering about a foreign countryside to wage a campaign of vilification."

Player suggested that "instead of invective or retaliation . . . the U.S. government should simply suggest to the Dutch government that it instruct its airline to conduct itself as the Dutch expect our airlines abroad to conduct themselves . . ."

KLM has been waging a large-scale campaign in the U.S. because of U.S. government reluctance to give the Dutch a route to Los Angeles, another to Houston and a third linking New York with the Dutch Antilles.

I. A. Aler, KLM president, explained: "These requests . . . have up till now been refused on the ground that there is no balance of economic benefits between the U.S. and the Netherlands as far as aviation is concerned."

In other words, the U.S. carriers have no more to ask of the Netherlands as far as routes and traffic rights are concerned while KLM still wants a lot from the U.S.

Temporary Rates for PAA

Ten months ago, Civil Aeronautics Board predicted that new final system mail rates for Pan American World Airways would "materially help" the carrier, despite sharp subsidy cuts involved. Last week, the agency withdrew those rates because it feels PAA has been doing too well.

Where Pan Am had never been on a final system mail rate prior to last December, it is now back on the familiar status of temporary rates and CAB is in a position to recapture any "excess profits" it figures the airline may earn.

Of equal importance to the airline is the fact that total annual mail pay has been cut from about \$23 million to \$14 million, effective immediately. The \$9 million eliminated was subsidy. All future payments, under temporary rates, will consist solely of service payments for transporting mail.

Certification Claims Misleading

Misleading, and sometimes fraudulent, claims of CAA certification, while not new, appear to be on the upswing. A recent AMERICAN AVIATION spotcheck found six certification claims to be exaggerated or non-existent. Although most prevalent in "bogus" parts industry, the claims are also showing up in airframe modifications and conversions.

Apparent motives behind the claims: to attract financing or to attract customers so financing can be gained.

CAA itself can take no direct action under the Civil Aeronautics Act. It can bring such claims to the attention of the Federal Trade Commission, and under certain sections of the Act can take action itself if it can prove interference with air navigation or safety. Enabling legislation authorizing legal and punitive measures is needed.

Some attempts have been made at drafting such legislation but follow-up action has been slow. Until such time as they can acquire direct legal authority to deal with the problem, CAA officials are trying to encourage the aviation public to check through with the Regions or Washington headquarters to confirm certification claims.

WESTERN AIRLINES

Champagne Flights

Serving the major cities of the West with luxury beyond compare—reserved seats, gourmet dining, vintage champagne, and orchids for the ladies.

WESTERN AIRLINES

When & Where

OCTOBER

- Oct. 8-10—Second annual symposium on aeronautical communications sponsored by IRE, Hotel Utica, Utica, N. Y.
- Oct. 8-11—Air Transport Assn. ground equipment and maintenance facilities meeting, Saxony Hotel, Miami Beach.
- Oct. 10-12-SAE National Transportation Meeting, Hotel New Yorker, New York.
- Oct. 10-12-16—NACA triennial inspection, Langley Aeronautical Laboratories, Langley, Va.
- Oct. 13-20—Eighth Annual All-Texas Air Tour, headquarters Walton Bldg., Austin, Tex.
- Oct. 15-17—Radio - Electronics - Television Manufacturers Assn., radio fall meeting, Hotel Syracuse, Syracuse, N. Y.
- Oct. 15-19—Second annual world-wide conference of USAF flying safety officers, Keesler AFB, Biloxi, Miss.
- Oct. 15-19—National Industrial Conservation Conference, Phoenix, Ariz.
- Oct. 16—9th Airport Development and Operations Conference, Hotel Onondaga, Syracuse, N. Y.
- Oct. 16-18—Conference on magnetism and magnetic materials, sponsored by IRE, AIEE, APS and AIMMEE, Hotel Statler, Boston.
- Oct. 17-19—Southeastern Airport Managers Assn. annual meeting, Key West, Fla.
- Oct. 22-23—Radio Technical Commission for Aeronautics fall meeting, Hotel Marrott and CAA Technical Development Center, Indianapolis.
- Oct. 23-25—National Business Aircraft Association 9th annual meeting and forum, Miami, Fla.
- Oct. 25-26—Aircraft Electrical Society annual display of electrical equipment, Pan-Pacific Auditorium, Los Angeles.
- Oct. 29-30—Third annual East Coast Conference on Aeronautical and Navigation Electronics, sponsored by IRE, 5th Regiment Armory, Baltimore.
- Oct. 29-31—Air Traffic Control Assn., first national meeting, New Colonial Hotel, Washington, D. C.
- Oct. 29-31—Air Industries and Transport Assn. (Canada), annual general meeting, Chateau Frontenac, Quebec.
- Oct. 30-Nov. 1—Air Transport Assn. engineering and maintenance conference, Colorado Springs.

NOVEMBER

- Nov. 1-3—National Aviation Trades Association annual convention, St. Louis.
- Nov. 8-9—SAE national fuels and lubricants meeting, Mayo Hotel, Tulsa, Okla.
- Nov. 14-15—Aircraft Industries Association export conference, Miami Beach, Fla.
- Nov. 22—Tenth general assembly FITAP (independent air transport federation), London.
- Nov. 25-27—Aircraft Dealers & Mfrs. Assn. twenty-eighth meeting, Drake Hotel, Chicago.
- Nov. 25-30—American Rocket Society annual meeting, Henry Hudson Hotel, New York City.
- Nov. 28-30—First international meeting on ozone, Chicago.

DECEMBER

- Dec. 3—Flight Safety Foundation's 1956 seminar in cooperation with MATS, West Palm Beach, Fla.
- Dec. 17—Wright Memorial Dinner, Sheraton-Park Hotel, Washington, D. C.

JANUARY

- Jan. 28-31—Eighth Annual Plant Maintenance Show, Public Auditorium, Cleveland.



Safer Take-offs and Landings for USAF Lockheed C-130 "Hercules" ...with Marquette WINDSHIELD WIPERS

Marquette Windshield Wipers contribute an important safety factor to the new USAF Lockheed C-130 Hercules, first American aircraft basically designed for economical turboprop power and for the air movement of cargo.

Whatever the weather, pilots and co-pilots in the Tactical Air Command have *clear vision* for take-offs and landings. These wipers keep the windshields clean in snow, ice, sleet and rain. They are light in weight, yet rugged and positive in action.

Marquette Windshield Wipers are giving dependable performance on 17 military planes currently in production, and on virtually every airline in the world.

Other Marquette Products: PRECISION PARTS AND ASSEMBLIES
ANTI-FRICTION BEARING TEXTILE SPINDLES
HYDRAULIC GOVERNORS • SPRING CLUTCHES • ROTARY OIL PUMPS

MARQUETTE METAL PRODUCTS DIVISION

CURTISS-WRIGHT
CORPORATION • CLEVELAND 10, OHIO

West Coast Sales & Service Office:

4321½ Leimert Boulevard
Los Angeles, California

Industry News Digest

Defense Dept. Divides Responsibility For Electronics Among Three Services

Each of the three military services has been assigned responsibility for carrying out necessary production preparedness measures for a portion of the electronic components and sub-assemblies that are common to two or more services.

Purpose of the program (Defense Instruction 4240.1) is to strengthen the U.S. electronic production base, reduce its vulnerability to attack, expand inventory of critical electronic items and promote greater efficiency and shorter lead time in electronics production. The instruction was issued by Deputy Assistant Defense Secretary R. C. Lanphier Jr. (Supply and Logistics).

Responsibility was divided as follows:

- **Air Force:** relays, switches, thermistors, high temperature wire and the following types of tubes: Klystrons, Magnetrons, TR, ATR and related types, and traveling wave tubes and related types.

- **Army:** coils, dry batteries, indicating instruments, quartz crystal oscillator plates, resistors of various types, telephone and telegraph keys,

loudspeakers, microphones, headphones, transistors and diodes, and hydrogen thyratron and flat press subminiature tubes.

- **Navy:** capacitors, dry rectifiers, certain resistors, synchros, transformers and all power, transmitting, microwave and miscellaneous tubes except those assigned to Army and USAF.

Each service must designate a program manager for each of the electronic categories assigned to it. Each manager will prepare and review programs, take action necessary to carry out programs, including budget action, and keep the Electronics Production Resources Agency informed of his actions.

EPRA will compile data on production requirements and available capacity, both for current and emergency needs, and recommend minimum sustaining production rates.

The instruction noted that steps for maintenance of an adequate production base include, where necessary, "educational orders or studies, contracts to establish pilot lines and/or 'pump priming' contracts." Production improvement projects and facilities expansion are also

to receive consideration.

Where production capacity appears vulnerable to attack, consideration is to be given to enlargement of inventory, creation of additional sources, protective construction and dispersal of existing stocks.

Lockheed Receives \$166-Million Order

Letters of intent awarding contracts totaling \$166 million for interceptor and trainer versions of the F-104 Starfighter have been received by Lockheed Aircraft Corp.

One contract, \$115 million, is for interceptors, while the balance, \$51 million, covers two-place "B" trainers. The F-104's performance is still classified.

Bell X-2 Crashes On Routine Flight

The Bell X-2 rocket plane, which only a few weeks ago established an altitude record of 126,000 ft. (see page 28), crashed Sept. 27 on a flight at Edwards AFB, Calif. The pilot, Capt. Milburn Apt, who was making his first flight in the plane, was killed.

USAF said the accident occurred during the flight itself, and not during takeoff or landing. The flight was a routine exercise, with no attempt for a record.

Lockheed Asks CAA Certification of Two Jets

Formal application has been filed with CAA by Lockheed Aircraft Corp.'s Georgia Division for certification of two transports.

One is the GL-108, a commercial version of the C-130 turboprop transport, and the other is GL-135, described as a "light jet transport." The latter is understood to be a civil version of a design prepared for USAF Air Materiel Command's competition for a four-jet utility transport. Previously there had been no indication that Lockheed was preparing to enter this competition.

Application for C-130 certification was filed as part of a long-range development program for the plane.

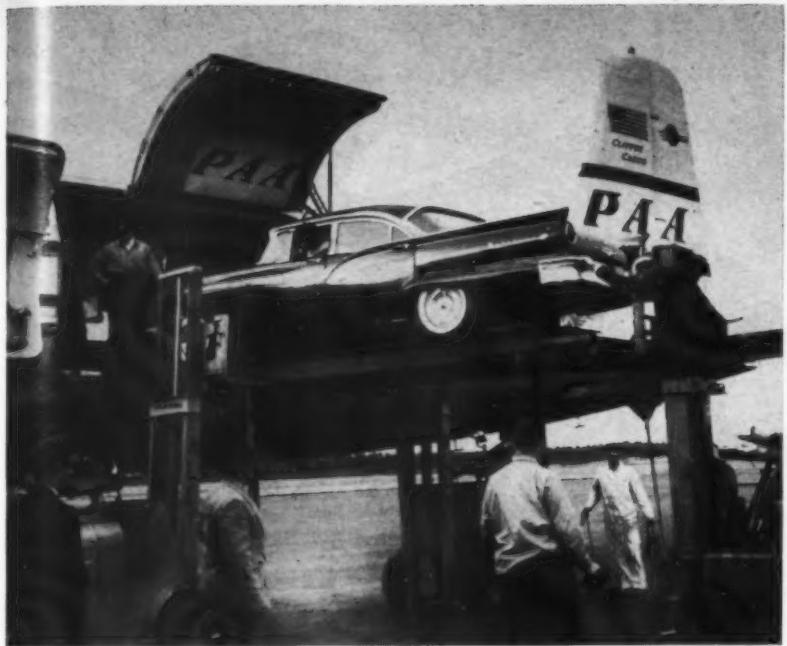
AF Lifts B-52 Ban

USAF lifted the grounding order on its Boeing B-52 jet bombers after a thorough inspection of the internal systems of each plane. B-52s were grounded following the loss of one of the intercontinental bombers in California Sept. 17. USAF said investigation of the accident is continuing and further analysis will be necessary to determine the cause.

Douglas Mocks Up Its DC-8 Jet



Scope of mock-up activity at Douglas Aircraft Co. is apparent in this view of one-wing wooden version of its DC-8 jet transport. Unit is being used as realistic model for placement of systems, wiring and components. It includes movable control surfaces and landing gear that extends and retracts. Empennage and tail cone will be added later.



Finnish freight handlers help offload 1957 Ford from Pan American World Airways DC-6A at Helsinki. Car was crated, sent to U.S. Embassy in Moscow by train.

Parrish Editorial Brings Action: Ford Gives Moscow Look at Modern U.S. Car

The idea for display of a 1957 Ford in Moscow on Oct. 1, two days before the new model was unveiled in the U.S., was credited by Ford Motor Co. to an editorial by Wayne W. Parrish, editor and publisher of American Aviation Publications, in the April 9 issue of AMERICAN AVIATION.

The Ford was one of eight sold to the State Department for use by the U.S. Embassy in Moscow. It was flown in a Pan American World Airways DC-6A freighter to Helsinki, Finland, and continued to Moscow on a Russian rail car. The four-door sedan reportedly attracted large crowds in the Russian capital.

* Ford Motor Co. explained in a news release that "when the USSR sent its pride jet airplane, the TU-104, to London to show off Soviet aviation progress, some British newspapers enthusiastically praised Russia for many kinds of industrial achievements.

This provoked an editorial in . . . AMERICAN AVIATION urging the U.S. to do more to tell the story of its economic accomplishments abroad. Specifically suggested was the sending of the latest U.S. automobile to Russia.

The editorial came to the attention of the White House, which passed it along to the Department of State. Ford . . . heard about the suggestion and offered help at the same time that the

State Department was considering the idea . . . Ford offered to send the first available 1957 model to Russia . . . to demonstrate American economic progress and the high standard of living which enables Americans to buy 6.5 million cars a year . . .

In the editorial, Parrish had noted that there were no modern American cars in Moscow at the time of his visit there last November. "Wouldn't you think that one of the most dramatic demonstrations of the country's economic power would be to place at the disposal of the American diplomatic force in Moscow one each of our latest models?" he asked. He predicted that if this were done the reaction would be "sensational" with "crowds surrounding them wherever they stopped in the city."

CAA Orders Convairs For Airways Tests

CAA has ordered five Convair 440 pressurized aircraft for airways tests in intermediate altitudes between 10,000 and 20,000 feet. Order, being placed through the USAF Air Materiel Command, is expected to amount to about \$3.5 million. Final price depends on number of Convairs ordered by Navy and Air Force, since one large contract will be placed for the three services.

CAA 440s will be military version (C-131E) with floors stressed for heavy loads, cargo doors and special antennas for electronic testing equipment. CAA expects deliveries in December 1957 and January 1958.

CAA, CSC Agree On Controller Pay

Civil Aeronautics Administration and Civil Service Commission have agreed on new pay standards for air traffic controllers, thereby easing the impact of controversial new CSC standards slated to become effective late last month.

New agreements are expected to include a two-year moratorium on any controller downgrading at low-activity CAA towers, a feature that touched off most opposition to CSC's earlier standard.

Here's how the newly-accepted standards will affect CAA personnel:

- **High-traffic centers**—chief controllers move from GS-12 to -13; asst. chiefs from GS-11 to -12; some senior controllers (GS-11) move to GS-12 as "watch supervisors," others remain at GS-11; controllers move from GS-10 to GS-11, except in some categories which become "associate controllers" at GS-10. Asst. controllers at GS-7 are upgraded to GS-8. High traffic towers are those having 500 or more departures on peak IFR days.

- **High-traffic towers**—Promotions scheduled for all personnel classes. To qualify in this class tower must have six or more controllers on duty at least 400 hrs. a month. Alternatives are (1) 7,500 operations with at least 200 IFR approaches per controller per year, or (2) an average of at least 10,000 operations per controller annually.

- **Medium-activity towers**—chiefs and controllers stay in present grade, assistants increase one grade. Class requires three controllers on duty at least 400 hrs. per month. Alternatives: (1) annual average of 13,000 operations per controller; (2) average of at least 350 IFR approaches per controller per year.

- **Low-activity towers**—chiefs and assistants remain status quo. Controllers are downgraded one level, but CAA is expected to receive two-year moratorium from CSC on implementing any downgrading.

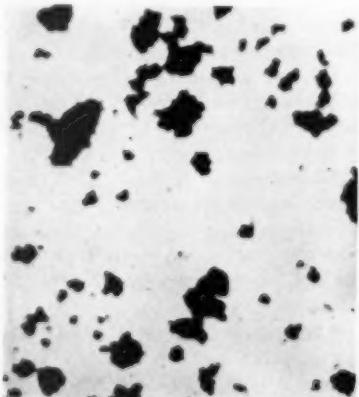
- **Insacs**—New high-activity category affecting between 30 and 35 Insacs is established. Chiefs with a staff of five or more journeyman communicators handling 80,000 activity points in the highest six-month period of the

(Continued on Page 18)

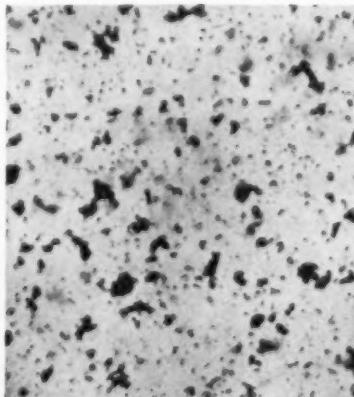


SAFER BATTERY POWER

New GOX active material. Ultrafine particles give three times the surface area contact with electrolyte—boosts high rate capacity performance. Gives quicker response. Photomicrographs 400x magnification.



Ordinary active material.
Particles are coarse.

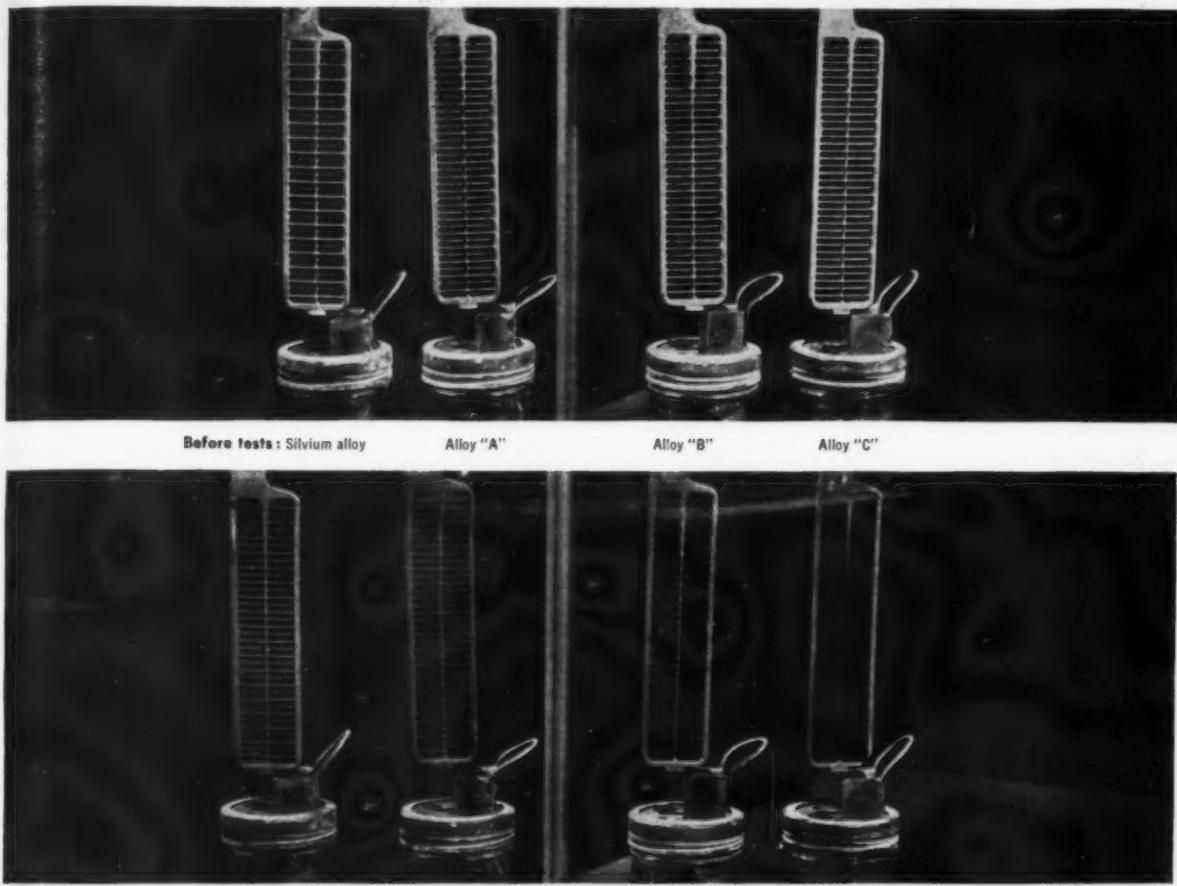


GOX active material.
Particles are fine.



New Pormax separators. 25% more porous. Pore size easily controlled. Electrolyte circulates more freely. Pormax separators are less subject to hardening with age.

New Silvium grids. Test proves Silvium resists corrosion better than any other commonly used grid alloy.



R FOR COMMERCIAL PLANES!

**Exide announces new, greatly improved aviation batteries . . .
safer against sudden failure, superior in capacity and life potential**

With these new Exide Aviation Batteries, airlines can now practically forget the danger of sudden battery failure. Costly takeoff delays from unforeseen loss of battery power can be largely a thing of the past.

The reason lies in the new Silvium® alloy grid metal used in the positive plates of these batteries. This special alloy was developed by Exide to resist corrosion. And in aviation battery use, it prolongs grid life far beyond average battery life. Hence users have this extra measure of protection against grid failure—and against loss of electrical power. Silvium is used exclusively in Exide Batteries.

Protection like this is especially significant today because of the heavier

electrical loads aviation batteries must carry. And it is especially valuable in long distance flights, where there's risk of repeated overcharging.

New active material—new separators

The new Exide-developed GOX active material used in these batteries packs more power per ounce than the oxide formerly used. Finely ground oxide particles offer three times the surface area to the electrolyte than ordinary types of active material do. GOX means quicker response to sudden power demands.

Pormax separators add both quicker response to sudden power demands and longer life potential. Pormax is a new microporous plastic, 25% more porous with a more easily controllable pore size than the previously used rubber

separators. It is also less subject to hardening with age.

See for yourself how much better battery performance these new Exide Aviation Batteries can give you. Call your nearby Exide sales office and ask for a demonstration. Batteries are available in four models covering a wide range of capacities. For descriptive catalog and technical details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

Industry News Digest

(Continued from Page 15)

year move up one grade, as do communicators handling 16,000 points or more for the highest six-month period.

CAB Formalizes Ruling In N. Y.-Florida Case

Civil Aeronautics Board has issued its formal opinion and order in the New York-Florida Case setting November 27 as the effective date of new certificates awarded in the case. Board previously announced its findings in a "press release decision" issued August 10.

In addition to a New York-Miami award to Northeast Airlines, CAB also extended National Airlines to Boston, certificated Delta Air Lines to serve Tampa, and granted new rights to Eastern Air Lines, Capital Airlines, Trans World Airlines, and United Airlines in the general Boston-Washington area.

In a simultaneous action, CAB instituted an investigation to determine if Howard Hughes has acquired an interest in Atlas Corp. in violation of the Civil Aeronautics Act. CAB's initial interest stems from the fact that Hughes, through Hughes Tool Co., controls TWA, and Atlas Corp. (headed by Floyd B. Odlum) controls Northeast. A National-Eastern complaint to CAB alleged Hughes acquired an 11% interest in Atlas in last year's mergers involving Hughes' RKO Pictures Corp. and Atlas.

Wm. E. Boeing Dead

William Edward Boeing, Sr., 74, founder of Boeing Airplane Co., died Sept. 28 following a heart attack.

Mr. Boeing formed Pacific Aero Products Co. on July 15, 1916. Name of the company was later changed to Boeing Airplane Co. Mr. Boeing withdrew from the business in 1934.

News Briefs

MANUFACTURING-MILITARY

* Gen. K. B. Wolfe, who retired recently as president of Oerlikon Tool and Arms Corp. of America, has been named assistant to the chairman of the board of The Garrett Corp. He begins work immediately on special top-level assignments being projected by the company. Gen. Wolfe retired from the USAF in 1951.

* Backlog of complete aircraft, engines and propellers totaled \$17,195 million as of June 30, Bureau of Cen-

sus and CAA reported. This was 6% over Mar. 31 backlog and 23% ahead of June 30, 1955. Also reported were July shipments of 516 complete civilian planes worth \$32.2 million. Unfilled orders for planes of 3,000 lbs. and over totaled 1,015 at end of July, up 158% from same period last year.

* New-type radar to be incorporated in the MD-9 tail defensive systems of USAF's B-52 bombers is being produced by General Electric's light electronic equipment department at Utica, N. Y. MD-9 system is produced by Arma Division of American Bosch Arma Corp.

* A two-stage high-altitude research vehicle called "Terrapin" has flown to an altitude of 80 miles from National Advisory Committee for Aeronautics' proving ground at Wallops Island, Va. Terrapin was designed by Republic Aviation Corp. and its instrumentation by University of Maryland students. Republic has completed preliminary design for a third-stage rocket to carry the vehicle to over 200 miles altitude.

* Structural tests necessary to meet a scheduled first flight date of about Oct. 10 are expected to be completed ahead of time on Lockheed's Model 1649A Super Star Constellation.

* A multi-million dollar contract has been received by Radio Corp. of America and Minneapolis-Honeywell Regulator Co. to perform research and development of an integrated electronic weapon system for Royal Canadian Air Force's CF-105 jet fighter. System is called "Astra."

* A Curtiss-Wright Turboelectric propeller installed on a Military Air Transport Service YC-97J transport has accumulated 1,000 hrs. of flying time. MATS said the propeller, driven by a P&W T34 turboprop engine, was the first of its kind to operate 300 hrs. without a periodic 100-hr. inspection.

* The Army awarded a \$2,383,000 contract to flight school operator William J. Graham & Son, of Pittsburgh and Marianna, Fla., to operate its fixed-wing, primary flying school at Edward Gary Air Field, San Marcos, Tex. Cost-plus-fixed fee contract expires July 1, 1957. First class reports for training on Dec. 31.

* Greer Hydraulics Inc. established a research and development division, headed by Jules Kendall with the title of v.p. in charge of research and development.

* Flight testing and preparation of the first Boeing KC-135 jet tanker for delivery to USAF Oct. 31 is ahead of schedule.

TRANSPORT

* Herbert K. Hyde, who has been commissioner of transportation and public utilities service with General Services Administration, was named administrative assistant to CAB Chairman James R. Durfee.

* CAB issued a show-cause order proposing a permanent certificate for Trans-Pacific Airlines. This is the first action by CAB implementing legislation passed by the last Congress guaranteeing permanency for Hawaiian and intra-Alaskan operators whose current certificates are temporary. Hearings will be held in the TPA case after expiration of a period in which other parties may file objections.

* CAB suspended and will investigate tariffs of Capital Airlines and Northwest Airlines which proposed various changes in the half-fare family plan. Tariffs were to have become effective in late September. Capital proposed to include Saturday as a family plan day, while NWA wanted to apply the plan on all days of the week. Several other carriers had objected.

* National Airlines' net earnings after taxes totaled \$4,300,143 for the fiscal year ended June 30, 1956, against \$3,075,778 profit in previous year. Operating revenue rose 14% to a record \$55,468,848, while expenses gained 10% to \$46,277,799.

* CAA awarded contracts totaling \$1,544,631 to 39 contractors for furnishing the 445,994 electronic tubes required to keep its airways facilities going through the fiscal year ending next June 30. Tubes include 445 types of all sizes and shapes and vary in price from 22¢ to \$1,530.

* American Airlines reported that its August freight traffic of 7,079,547 ton-miles set a new airline record for one month and that its passenger traffic set a new August record and was second only to the industry mark it established in June. Passenger traffic was 467,317,000 passenger-miles, up 17.2% over same 1955 month.

* Quebecair, Canadian air carrier, ordered two Fairchild F-27 Friendships for early 1958 delivery. Contract is worth \$1.3 million. Company also optioned two more F-27s.

* Los Angeles Airways ordered another Sikorsky S-55 helicopter for delivery shortly after the first of the year. Its fleet will then total six S-55s and two S-51s.

* Northeast Airlines signed a contract with Air Line Pilots Association, ending a strike threat. Agreement puts NEA's rates on a par with the "industry average." No changes, however, were made in the present retirement plan.

Production Spotlight

• Cessna Aircraft Co.'s production of the T-37A twin-jet side-by-side trainer will run to more than 500 aircraft, according to some Pentagon estimates. Newest order for the lightweight jet, expected to be signed soon, will be for 250 planes. Present orders total more than 250.

• Big missile question-mark is the role of Fairchild's Goose. Foreign trade publications persist in classifying it as an interceptor missile to be carried by Convair B-58 Hustler. Others say it is a 20-to 30-foot long all-plastic decoy missile carrying a "corner reflector" to confuse enemy radar. One speculation frequently heard: it could be air-launched by B-58s on strategic bombing mission to sidetrack defensive surface-to-air missiles.

• British are pushing North Atlantic installation of Dectra long-range navaid. A Canadian station is expected to be completed at Gander, Newfoundland, by January. European facility will follow in spring of 1957 at Prestwick, Scotland.

• North American's supersonic A3J attack bomber will get General Electric J79s in prototype and production models. Twin-jet is described as "highly supersonic."

• Douglas is calling its line of B/RB-66s twin-jet bombers now being delivered to USAF "Destroyers."

• Cessna now has a backlog of about 500 L-19 liaison aircraft, including several foreign orders in addition to new commitments from Army. Company also expects to deliver the first 10 CH-1 helicopters to Army next August.

• Two jet fighter projects developed jointly by Spanish and German companies have been inspected by USAF specialists. They are the CASA-Heinkel XC-6 and the Hispano-Messerschmitt XC-7.

• A VTOL project developed by Short Bros. & Harland in Northern Ireland is about to start its flight test program.

• Some steel industry sources familiar with USAF requirements believe all new combat aircraft developed after 1958-59 will have steel airframes. Only announced aircraft in this category at present is the stainless steel Bell X-2 research plane.

• Fuji Heavy Industries has received an off-shore procurement contract from U.S. for 24 LM-1s, the Japanese version of Beech T-34 trainer. Aircraft will be supplied to Japanese ground self-defense forces.

• Last Hispano-Suiza Verdon-powered Dassault Mystere IVA ordered under U.S. off-shore procurement program was delivered recently. Total Mystere IVA production was more than 400 aircraft.

• Hayes Aircraft Corp., Birmingham, Ala., has IRANed more than 1,400 North American B-25s, has a new \$2.2-million follow-on contract.

• When Navy gets around to reordering the Temco TT-1 jet trainer, it may specify General Electric's J85, derated to about 1,500-1,700 lbs. thrust instead of present 920-lb.-thrust Continental J69.

• First flight testing of an aircraft fitted with hollow aluminum props will be Lockheed's 1649A Super Star Constellation. TWA ordered new blade from Hamilton Standard. Later, a 1649A will be tested with Curtiss hollow steel blades specified by Air France.

• A new French naval aircraft, the Breguet 1050 Alize, is about to start flight tests. It is powered by a Rolls-Royce Dart turboprop.

• The Agusta AZ .8 twin-engine transport is now in advanced construction state. Italian plane likely will make its first flight in January.

64 pages!

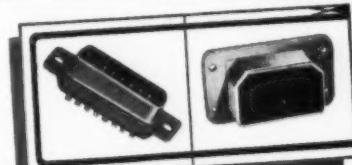
New Material on

CANNON

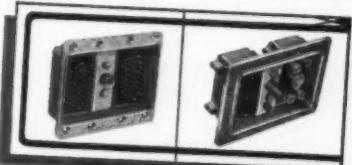
Rack-Panel-Chassis

CONNECTORS

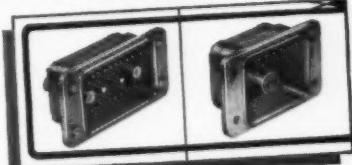
THE MOST COMPLETE LINE AVAILABLE



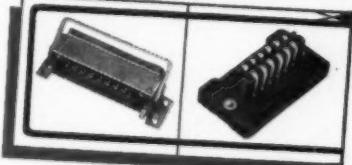
Steel-shell sub-minis in 4 sizes, 15 to 50 five-amp. contacts. Hermetic seal pin side also available. Aluminum-shell miniatures in two sizes, 9 inserts.



Instrument panel disconnects.



Twinax, coaxial, thermocouple, hi-voltage contacts available.



For use in close or cramped quarters. Radio terminal connectors, right, have no shell, designed for quick-disconnect on radio chassis.

Cannon DP-RTC rectangular connectors range all the way from sub-miniature to standard size units... meet every need where space is a problem.

Insulators are designed for strength, lightness and high dielectric qualities. Contacts are copper alloy, precision machined from solid bar stock for perfect fit. Socket contacts, wherever size permits (except RTC leaf type), use closed-entry construction to prevent spreading that might be caused by over-sized contacts or test probes.

Write for New DP9
Bulletin—a new kind of engineering bulletin. Please refer to Dept. 404



CANNON ELECTRIC

CANNON PLUGS

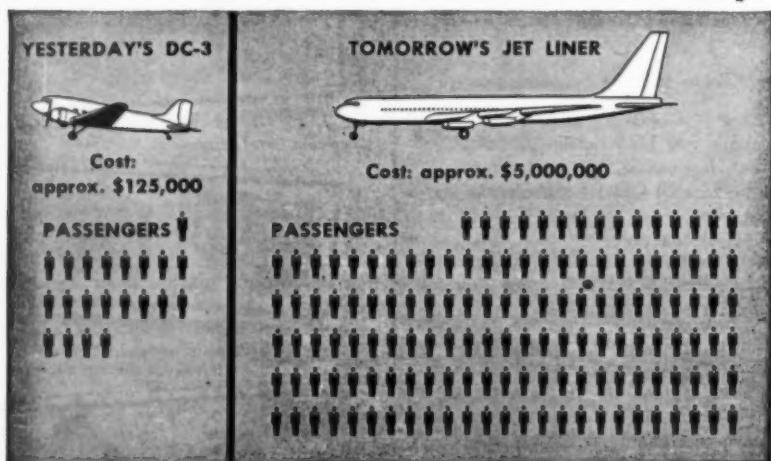
CANNON ELECTRIC CO., 3209 Humboldt St., Los Angeles 31, Cal.

Circle No. 5 on Reader Service Card.

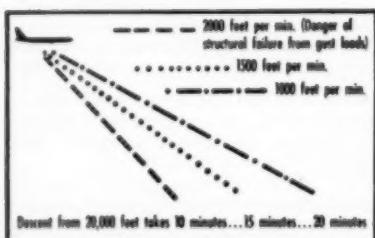
Is your present safety program BIG ENOUGH for tomorrow's airliners?

Compare your equipment . . . your passenger volume . . . your cost and risks of doing business today with 15 years ago. And tomorrow, the stakes will be even higher.

COMPARE YOUR INCREASE IN CAPITAL INVESTMENT AND RISK



Skydrol protects your capital investment and lessens your liability risks.



The chart above proves what many pilots already know: To descend and land from high altitude takes so much time that fires in flight can be critically dangerous! You

can lessen the possibility of these fires simply by replacing flammable hydraulic fluid with fire-resistant Skydrol . . . the world's only fire-resistant hydraulic fluid approved by the C.A.A. 4½ million flying hours' experience have proved Skydrol a better lubricant than mineral oil . . . extremely stable . . . can be re-used again and again and won't corrode metal. Conversion to Skydrol costs less than you think! For more information, write . . . *Organic Chemicals Division, MONSANTO CHEMICAL CO., Dept. SKD-3, St. Louis 1, Missouri.*

34 MAJOR AIRLINES NOW USING SKYDROL

American	National
Braniif	Northeast
Continental	Panagra
Flying Tiger	Western
Pan American	Aigle Azur
Canadian Pacific	Cathay Pacific
North American	Alitalia
Aircoach	Swissair
Trans-Caribbean	United

Delta	LAI
Slick	ANA
JAL	Aramco
PAL	U.S.A.F.
CMA	B.O.A.C.
KLM	Northwest
LAN	Airwork, Ltd.
TAI	Lasca
UAT	

Skydrol Reg. U. S. Pat. Off.

MONSANTO CHEMICAL COMPANY • ST. LOUIS, MISSOURI
Where Creative Chemistry Works Wonders For You

Letters

Endorsement

To the Editor:

I wish to offer my personal endorsement of your views on excess baggage regulations, as expressed in "Personal View" of August 27.

As factory representative for Zephyr Manufacturing Co. Inc. (an aircraft tooling firm) I too have often sworn under my breath at the widely divergent practices of the airlines as regards excess baggage.

It must be completely obvious that no business traveler on a two-to-three-week trip can possibly avoid exceeding a 40-pound baggage limit. I personally carry a three-suiter bag averaging 32 pounds, a brief bag running from 25 to 28 pounds, and a dictaphone weighing approximately 21 pounds. As you can see, excess charges on a trip from, say, Los Angeles to Cleveland, can amount to quite a figure.

As it happens, I hold cards for TWA's Ambassadors' Club, American's Admirals' Club, and United Airlines 100,000-Miler Club. These courtesies are really appreciated and occasionally come in very handy. However, I would be much more impressed by recognition of the true needs of the average traveling man using the airlines as his principal means of transportation.

I have long held that bona fide business travelers with annual mileages over some reasonable figure should be allowed the 66-pound allowance given to international travelers.

Therefore, it pleases me greatly to see your stand on the matter.

I have observed before that your opinions seem to carry considerable weight when expressed on the printed page.

Congratulations and more power to you.

C. J. SWAIN,
Factory Representative
Zephyr Manufacturing Co. Inc.
Inglewood, Calif.

Books

Air Touring Guide to Europe

1956-57. Published by Royal Aero Club Aviation Center, 19, Park Lane, London, W. 1, England. Price, 10 shillings (\$1.40) plus postage.

This 224-page annual is valuable for aviation travelers in Europe. It also contains much data on airfields, air maps, customs and other official regulations for all countries west of the Iron Curtain.

Vapour Trails. By Mike Lithgow. Allen Wingate Publishers Ltd., 12, Beauchamp Place, London, S.W. 3., England. Price 13 shillings 6 pence (\$2) plus postage.

Flying experiences in war and peace recounted by ten leading British airplane test pilots, edited and introduced by the deputy chief test pilot of Vickers-Armstrongs.

From Hats... to Helicopters

From the haberdashery business to the helicopter business in 60 days was the transition made by Capt. Kenneth W. Holzer of Russell, Kan., in the early months of the Korean conflict.

So thorough and efficient is the U.S. Army's pilot training, that Capt. Holzer, who began a rotary wing course in March 1952, graduated May 1 and in August of the same year was flying helicopter missions in Korea as an artillery spotter.

On one of his reconnaissance missions in a Bell H-13 helicopter, he helped restore critical lines of communications by dropping ropes from the air and hauling a torn-away temporary bridge back to shore.

Capt. Holzer is now an Army career pilot, helping to maintain the high standards of rotary wing indoctrination for aviation cadets at Fort Rucker, Ala., the Army's Aviation Training Center.



CAPT. KENNETH W. HOLZER
"...teaches 'Copter Cadets"



A combination of the best pilots, equipment and maintenance gives the Army a new aerial dimension of mobility and flexibility. Capt. Holzer demonstrates in photo how critically needed supplies can be transported in the shortest possible time by helicopter.

Helicopters need pilots and mechanics!

Apply to Army Aviation for career training!

BELL
Aircraft Corp.

TEXAS DIVISION
P. O. Box 482
FT. WORTH TEXAS

Washington, D. C., Oct. 8, 1956

AIR FORCE'S PLANS TO BEEF UP the Tactical Air Command's striking force may produce a loud backfire if a cut in the USAF goal of 137 manned aircraft wings is ordered. Likelihood of such a cut is increasing. Defense Chief Wilson confirmed reports that an adjustment in wing strength is under study in connection with the fiscal 1958 budget request. He balks at saying whether a reduction will be made, but that's the clear implication of his press conference remarks.

If a cut is ordered, it's expected to fall most heavily on TAC. Ironically, TAC's efforts to strengthen its mobile striking power through use of tankers may be seized upon as one justification. Look for the argument that fewer TAC wings will be needed in the future to accomplish present missions because of their increased ability to reach overseas trouble spots in a hurry.

POSSIBILITY OF SOME SHIFT of Army aviation research and development responsibility to USAF is in the wind. Wilson favors some realignment of activity. But he apparently believes that Army should retain control of research and development directly related to its organic aviation requirements.

FINANCES PERMITTING, the military services may prove a big market for companies interested in small jet transports. USAF alone figures it will need up to 1,500 twin-jet and 300 four-jet utility transports. Army and Navy together may have a need for a like number.

SHARP UPSWING in aircraft industry employment occurred during July. Total reached 803,700, first time it's topped 800,000 since peak of Korean war in 1953. And it's still climbing. Stepped-up hiring of engineers, designers and draftsmen is believed to be a principal factor. Weekly wages are also up, averaging \$95.76 in July, or \$1.10 over June. Working hours edged up to 42 a week, an increase of 18 minutes over the previous month.

MANUFACTURERS' DIFFICULTY in finding qualified production personnel is illustrated by Ryan Aeronautical's experience. During two-month period this summer, Ryan found only 594 of 5,464 job applicants had the necessary qualifications. Although this ratio is hardly more than one in 10, it's still better than 1955, when the company hired only 7.5% of 28,731 applicants interviewed.

NEW PENTAGON PROGRAM for regular replacement of in-use machine tools and production equipment promises to give military producers up-to-date facilities in a more timely manner. The services have been instructed to make separate appropriation requests each year, totaling \$150 million, to replace existing obsolete tools with new equipment.

PRIMARY ALUMINUM PRODUCERS see an increase in demand for their metal during the first half of 1957. They've asked the government to suspend deliveries to the national stockpile. But for the 1958-59 period, they feel aluminum supply will be substantially in excess of foreseeable demand.

CONOLON

506*



* Trade Mark Registered

Quality's watchdog ...

with an economy bark!

If you are a designer or fabricator of high temperature airframe components—especially those involving intricate shapes, electrical transparency or weight limitations—you may well benefit from the unique design potentialities of Conolon laminating materials. Structural aircraft designers depend upon these materials because they offer the extra advantage of positive quality control from raw material through end product... *plus dollar-saving production economies!*

CONOLON laminating materials—made by Narmco, the pioneer in lightweight, high strength aircraft components—are pre-impregnated to the highest laboratory standards in the nation's finest coating facilities. CONOLON on pre-impregnated laminating materials is your assurance of satisfying

... and exceeding... the most exacting performance requirements of the aircraft industry.

Premium product of Narmco's laminating materials is CONOLON 506... specifically developed for the economical fabrication of intricate high-temperature structures. Approved for elevated temperature applications (MIL-R-9299), pre-impregnated CONOLON 506 cures at low pressure on expendable molds and requires no post-cure, thereby materially reducing tooling costs. Shipped in polyethylene-protected rolls CONOLON 506 is readily adaptable to the most complex fabrication — *where no metal can do the job.* For intricate, high-temperature airframe structures, CONOLON 506 is an ideal fabrication medium that offers extraordinary design potentialities.

Send today for Narmco's illustrated brochure on Conolon 506... a wealth of structural laminating data.



Narmco technical field representatives throughout the United States and Canada can assist in solving your structural design problems quickly, efficiently and economically. For immediate assistance, write, wire or telephone ...

NARMCO RESINS & COATINGS COMPANY, Dept. 766, 600 Victoria Street, Costa Mesa, California

B.F.Goodrich



4 hot recipes that do away with icing

SOME of these recipes for ice protection require more heat than others. But all of them call for B. F. Goodrich electrically heated rubber to give just the right amount of heat—in the right places.

Notice how B. F. Goodrich heated rubber fits snugly around the tricky curves and corners on these different airplane parts. And how the ice problem was solved in each case:

1. *On propellers*, it prevents ice from reducing propeller efficiency and cutting down plane speed.
2. *On reel oil coolers*, like these on the KB-50 (Hayes modification), it keeps ice from choking off vital air supply.

3. *On air intakes*, it insures smooth flow of air to engine parts and cabin heating system.

4. *On pitot mast*, it prevents ice from clogging air speed indicator and giving faulty readings on instrument panel.

In B. F. Goodrich heated rubber, resistance wires are sandwiched between rubber plies, then vulcanized into a flexible, lightweight unit. It can be easily cemented on the part or attached mechanically.

Other heated rubber applications for ice protection or heat control include antenna masts, wing and empennage

leading edges, spinner domes, jet engine air intakes, and radar equipment.

If you are looking for the most efficient method of applying spot heat, consult a B. F. Goodrich engineer. He'll be pleased to help.

B. F. GOODRICH AVIATION PRODUCTS,
a division of The B. F. Goodrich Company,
Akron, Ohio

B.F.Goodrich

AVIATION PRODUCTS Tires, wheels, brakes •
De-icers • Inflatable seals • Fuel cells • Avtrins •
Heated Rubber • Pressure Sealing Zippers • Rivnuts •
PlastiLock adhesives • Hose and rubber accessories

Common System Pattern Begins to Emerge

Problem defined clearly for first time and action is under way with White House leadership.

By LOIS C. PHILMUS

ORDER has finally emerged out of chaos in the development and operation of a common system of air traffic control and airways. The present system is being expanded and improved to solve immediate needs and a definite pattern for the future is emerging.

For the first time in aviation's history, the problems have been defined and decisive action is being taken. A spirit of cooperation has descended upon all users of the airspace and lines of communication have opened up among the military and civil factions that may preclude bitter battles such as the recently resolved Tacon dispute.

* **Commerce Under Secretary Louis Rothschild** keynoted the approach to aviation problems by the government as being two-fold: First, the government must be sure that present facilities are up-to-date. This is being accomplished under the telescoped three-year \$246-million airways development program. Second, "we must expand the frontiers of knowledge to make aviation ever safer and more dependable, as well as to make more efficient use of our air space."

Special Presidential aide Edward P. Curtis, charged with developing a master plan for facilities and organization for the future, this month completed six months in Washington. While his overall assignment will not be concluded until next summer, a definite pattern is emerging.

Next Step Outlined

The systems engineering team, Curtis' brain trusts, developing the actual master plan for the aviation facilities, will have concluded the project in January. The next step, the White House aide told AMERICAN AVIATION, must be establishment of a central facility for in-service testing of the new system proposed.

Noting that such a proposal would be included in his overall organiza-

tional plan, he emphasized the point that such a facility would be necessary for evaluating the master plan. The military and civil agencies have testing facilities, but just for individual components.

* **What Curtis envisions** is an organization equipped for airborne and ground equipment for testing components in an integrated system on a continuing basis. It would provide for both simulation and field-testing in a combined military-civil operation.

As to what the system will be, Curtis, of course, will not know officially until January. He said that several are being looked into, but that whichever is recommended it probably would be based on air-derived information fed into ground computers for enroute and ground installations for terminal operations.

There is little doubt, however, that the system derived will use an all-weather automatic control for all planes at all levels of flight and speeds. The

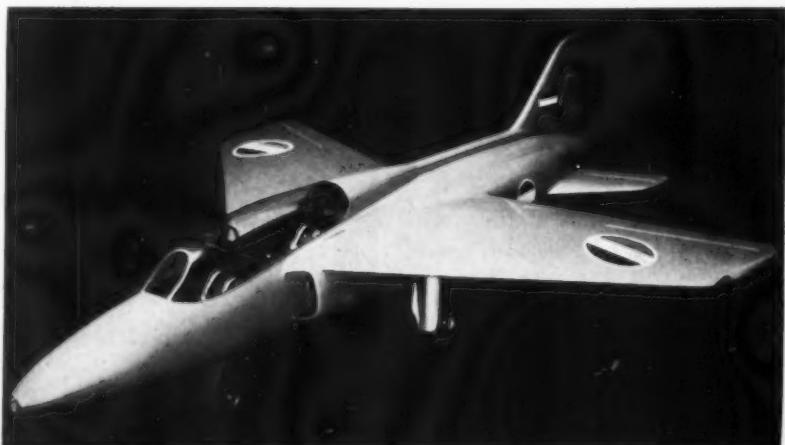
proponents of SAGE, who urge that it be adopted philosophically and mechanically as the basis of the automatic common system, will probably be overruled. Curtis stated that it "may be too complex" but "no doubt some elements can be used." This stacks up with the feeling of other top experts.

* Some high military officials, at this time, do not envision SAGE as a common control system. It is viewed as having a pure defense application and barring any possible frequency interference with the Federal airways, will not be available for integration purposes as a whole system.

Bell Report Studied

Getting careful attention from the Curtis' team is a document that comes closest to envisioning things to come. It is the final report of Bell Telephone Laboratories on work carried out under Army contract. It calls for the institution of a semi-automatic system of air traffic control as "a necessary and de-

Two-Seat Folland Gnat Trainer



This two-seat trainer version of Folland Gnat, now in project stage, is slightly larger than fighter. Fuselage is longer and span is greater. By replacing gun bays with fuel tanks, endurance is increased to 75 minutes.

sirable step in the evolution of the more fully automatic system which future densities of high performance aircraft will require."

The Bell report found the air-ground data link offers the best means of automatically transmitting aircraft position information, with radar information and voice reports, in the early transition phases, important complements. It calls for the semi-automatic system to be so designed that un-equipped aircraft do not require basically different treatment from the controller.

Most important point made in the recommendations probably is the observation that the system should be capable of "continuing evolution" so that as aircraft performance and traffic density rise, many of the controllers' functions can be easily transferred to automatic computers.

* Bell estimated that the development cost of such a system would be about \$10 million over a possible five-year period. A rough estimate of implementation cost of a semi-automatic control center would be \$5-\$8 million. The center would cover an area of about 500 miles in diameter and be capable of handling 700 aircraft.

Some of the components needed for the Bell system, in addition to data link, include: automatic derivation and encoding of aircraft altitude, azimuth and distance; data processing and transmission system; data storage; pictorial controller display; and an Aircraft Position Information Converter (API-CON) for handling unequipped aircraft.

The intriguing element of the Bell recommendations are that the proposals are all available "within the state of the art." Other proposals would require years of engineering and development.

Curtis said the most serious handicap to implementation of any system is the "tremendous" time it takes for engineering. He knows there is "no quick or easy solution" to this and hopes to be able to work with components already in existence or on the way to being.

Change in Attitude

* What may go a long way toward helping in this area is a change in military attitude. It is acknowledged at top Pentagon levels that many of the months spent in battling for Tacan could have been saved by a more open security policy. A proposal made by Maj. Gen. Gordon A. Blake in Boston last Spring is getting very serious consideration and may be activated in the near future.

Gen. Blake had suggested that a

top level civil groups, such as the Radio Technical Commission for Aeronautics, get top security clearance. The group then would have access to and work with military electronic projects from their inception. In this way, any military components having possible common system application could receive joint effort from the start.

While the top aviation brains in the country are moving closer and closer to the airway system of the future, an equally essential project—that of requirements of the users—is making encouraging progress.

Curtis has found that the patterns for the future airline and military equipment and operations appear to be clearcut. Numbers, types and uses are clearly spelled out for many years to come. Two areas, however, need deep research and organization:

* The future use and complexion of VTOL/STOL equipment cannot yet be predicted. While it is known that this type of aircraft can drastically change aviation facilities requirements in certain areas, much more must be found out about their characteristics and future application.

* No. 2 is general aviation. Curtis has found that predicted statistics are based on "opinion" rather than sound research. He expressed gratitude for the formation of the General Aviation Facilities Planning Group. It permits him to deal with one group, rather than the many that make up "general aviation." The group's retention of a competent research outfit—Booz, Allen and Hamilton—to conduct a requirements study has been lauded. Firm statistics are imperative for proper planning.

* In summation, Curtis observed: The plan and organizational recommendations will be completed on schedule. A leadership follow-through on implementation should take place im-

mediately thereafter. He is certain that military-civil cooperation will continue to improve.

Noting that the system, whatever it finally will be, will cost money, he added that he foresees no difficulty in getting Congressional appropriations. Congress now "is in a very receptive mood to anything that makes sense."

A year ago the air of constructive optimism that now prevails in Washington aviation circles would not have seemed possible. But AMERICAN AVIATION has found that all involved in the complexities of getting the airways into shape are willing to cooperate, are again talking to each other and are aiming for the same objective. In this atmosphere, coupled with Curtis' excellent leadership in his monumental assignment, the common system seems to be well on its way.

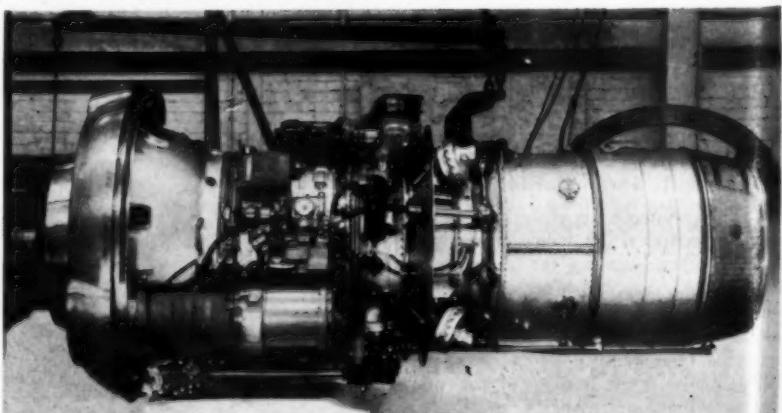
There are some mammoth problems yet to be faced and solved but in the new atmosphere they no longer seem insoluble. It may be safe to predict that controversy will always continue but the warlike atmosphere that prevailed during the Tacan controversy should be a thing of the past. * * *

GE Tests J47 'Hot Rod'

General Electric's Aircraft Gas Turbine Division is running a modified J47 engine on the test bed at higher-than-normal temperatures in an effort to solve powerplant problems of Mach 3-to-4 flight.

The engine, known as the "Hot Rod," is being run with tail cone and tail pipe temperatures recorded at 1,600-to-1,700 degrees F., compared to a maximum tail pipe temperature for the standard J47 of 1,275 degrees. Turbine temperatures over 2,000 degrees have been achieved experimentally. GE emphasizes that the engine is for experimental purposes only.

Bristol BE25 Turboprop Engine



Bristol's BE25 Orion 5150-hp turboprop is supplied as a complete powerplant ready for installation. Engine is currently being flight-tested in a Britannia.

Those Russian Delta Fighters Are Good

By ANTHONY VANDYK

Russia's delta aircraft will make formidable fighters. This is the conclusion that western experts have reached in assessing the merits of the three delta models which flashed over Tushino airport during the Russian air show last June.

By examining movie films, still photographs and comparing notes with those who attended the Moscow fly-by, western intelligence staffs have been able to obtain a reasonably accurate evaluation of the deltas' potential combat performance.

Expert opinion of the three delta aircraft that flew over Tushino can be summarized thus: The Russians now have flying delta aircraft capable of horizontal speeds in excess of 1,000 mph and of climbing speeds of some 35,000 ft. per minute. These aircraft are currently in prototype form and by the time they reach production status they may well be able to better this performance.

* The three prototypes seen at Tushino varied considerably in detail but the general design was clearly from one source. The deltas are generally attributed to Pavel O. Suchoi but there is no information on their designations. For convenience most specialists called the first fly-past the Suchoi-1, the second the Suchoi-2 and the third Suchoi-3.

The Suchoi-1 went past the crowds before it was generally realized that it was a delta model. For this reason there is less information on this model than on the second and third aircraft. The vertical and horizontal stabilizers of the Suchoi-1 are less swept back than those of the Suchoi-2 and Suchoi-3. The tailplane seemed set particularly high. The engine's intake was of a conventional nose type. In the Suchoi-2's nose intake a central shock diffusor could be seen. The delta wing of this model appeared to be more sharply swept back than that of the Suchoi-1. A blister was discernible under the rear portion of the fuselage.

The third delta, the Suchoi-3, was the most advanced. The nose featured a chin intake under a conical projection, reminiscent of the Chance Vought Crusader. The fuselage seemed to be more elongated than those of the first two models and some observers believed that the area rule had been applied to its design. (See data on the Suchoi-3 cut-away drawings.)

* As with all modern Soviet air-

craft, mystery surrounds the Suchoi delta's powerplant. While the name of the engine model is not yet available, Western experts agree that it is an axial type developing about 8,000 lbs. static thrust or 10,000 lbs. with afterburner.

Indications are that the Suchoi delta in operational service will use afterburner power to climb to an altitude of 7 miles (while doing so it will have covered a horizontal distance of about 50 miles). The 3,740-lb. fuel capacity is estimated to give the aircraft an optimum range of about 1,100 miles. Service ceiling naturally varies with gross weight but at 9,500 lbs. the delta's ceiling is 58,000 ft. At 12,750 lbs. gross the ceiling is 53,000 ft.

For a modern fighter the Russian delta has a good airfield performance. It needs 4,430 ft. to clear a 50-ft. obstacle when taking off at a gross weight

of 12,750 lbs. This is with the use of afterburner; without it 5,410 ft. are required. Coming in over a 50-ft. obstacle the aircraft uses 3,450 ft. at a landing weight of 11,000 lbs.

* Although the Russians have been very late in entering the delta field the Suchoi models indicate that Soviet designers have been keeping close tabs on what has been going on in delta design in the western world. They did not gain very much from German research in this wing planform since delta pioneer Dr. Alexander Lippisch went to the U.S. after the war. Nonetheless, the Russians undoubtedly realized that when Lippisch left Germany much had to be done to make the delta "work," particularly at the lower end of the speed range.

Much of the design work on the Suchoi deltas seems to be original although some observers see a resemblance

Data on Suchoi-3, Russian Delta

Dimensions

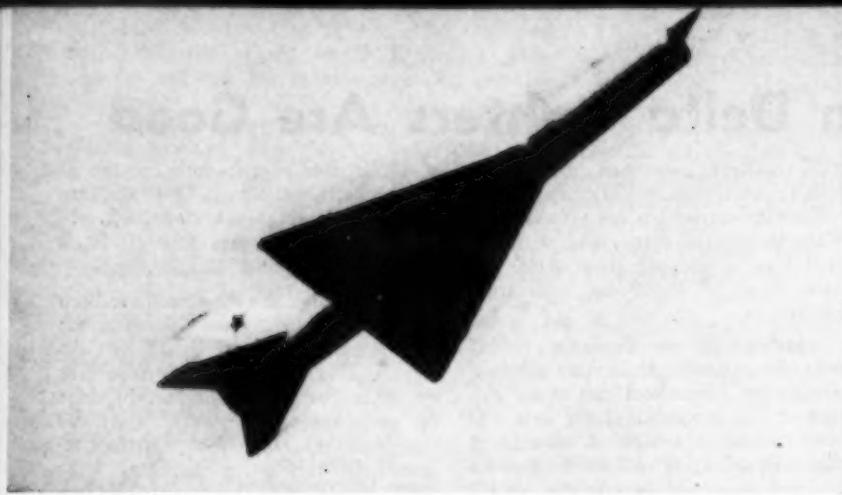
Total area	280 sq. ft.
Wing area	194 sq. ft.
Wing span	23 ft.
Wing leading edge sweep angle	60°
Wing aspect ratio	2.3
Wing taper ratio	0.04
Tail plane area	65 sq. ft.
Tail plane span	10 ft.
Tail plane leading edge sweep angle	60°
Tail plane aspect ratio	2.05
Length of fuselage	46 ft.
Width of fuselage	3 ft.
Height of fuselage	4 ft.

Weight

Airframe	4910 lbs.
Powerplant and accessories	2090 lbs.
Fixed equipment	440 lbs.
Additional equipment including armament	1320 lbs.
Pilot, parachute and seat	260 lbs.
Empty weight	9020 lbs.
Fuel	3740 lbs.
Take-off weight	12760 lbs.

Altitude (miles)	Maximum Speed			
	Without Mach number	Afterburner Speed (mph)	With Mach number	Afterburner Speed (mph)
0	0.95	725	1.05	800
2	1.01	740	1.20	880
4	1.06	750	1.43	1010
6	1.10	750	1.52	1030
7	1.11	730	1.57	1035
8	1.04	685	1.55	1025
9	1.49	980

Above speeds for horizontal flight are for a gross weight of 11,220 lbs. If the gross weight is increased to 12,760 lbs. the top speed at an altitude of 7 miles with the afterburner in operation is Mach 1.49 or 980 mph. At this gross weight, the aircraft's stalling speed would be 125 mph.



Russian Delta at Tushino.

Climb Performance With Afterburner		
Altitude (miles)	Rate of Climb (ft. per min.)	Climbing Time (seconds)
0	34,645	0
2	28,345	19
4	22,245	43
6	16,140	74
7	12,010	108
8	7,680	152
10	395	...

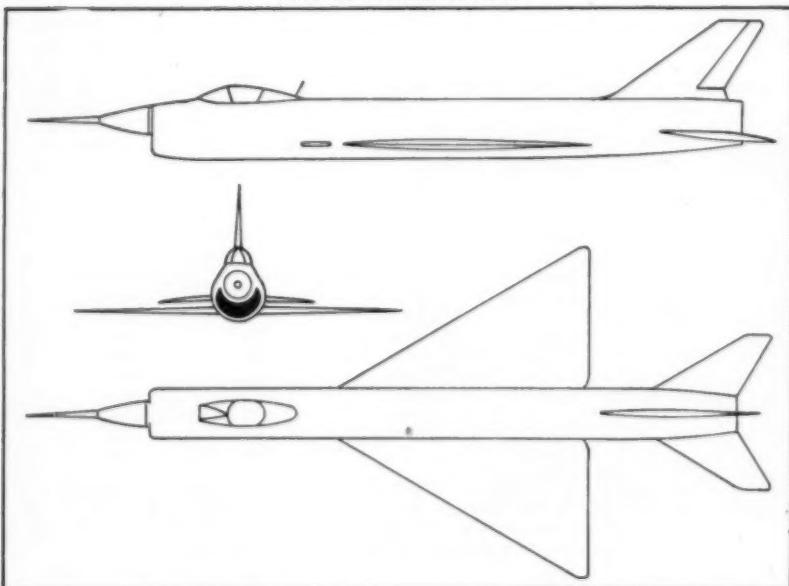
to the Convair F-102. The Suchoi design differs in one important respect from this and most other delta aircraft in that it has a horizontal stabilizer. The only models so equipped are the Douglas A4D Skyhawk, the Gloster Javelin and France's SNCA du Nord 1500 Griffon.

* Soviet designers believe that the

small amount of additional drag created by the horizontal stabilizer is more than offset by the improvement it brings to the aircraft's climb performance. They consider that addition of the horizontal stabilizer can increase service ceiling by some 8% for an aircraft with a thrust/weight ratio of about 0.9. Furthermore a faster rate of climb results and range goes up by about 4%.

There is some evidence that the Russians have not managed to avoid problems with their deltas at high speed. At the Tushino fly-past large quantities of pitot probes could be seen on all horizontal airfoils. There were also small notches at the trailing edge roots. Some observers noticed that one of the three Suchois suffered tail flutter during part of its brief appearance at Tushino. ♦♦♦

Three-views of Russian Delta.



Bell X-2 Hangs Up New Altitude Record

The Bell X-2 rocket plane last month attained an altitude of 126,000 feet—a new record for manned aircraft. At the controls was Capt. Iven Kinchloe, USAF Korean War jet ace.

The X-2's new mark eclipses the old record of 90,000 feet established by Maj. Arthur Murray in the Bell X-1A. In July, with Col. Frank Everest, Jr., at the controls, the X-2 also broke the X-1A's speed record of 1,650 mph with a new mark of better than 1,900 mph.

The Pentagon steadfastly refused to confirm either of the X-2's new records, although Defense Secretary Charles Wilson grudgingly admitted at a press conference that it had exceeded both the altitude and the speed attained by the earlier research vehicle.

It was learned that significant data regarding aerodynamic heating (up to 600°F during high speed runs) was obtained with the X-2, together with important information concerning control at high altitudes. Previous high altitude rocket-powered research aircraft have been subjected to severe tumbling and oscillation in the rarefied upper atmosphere. It was at one time proposed that the X-2 employ small hydrogen peroxide generators in the wings and other areas to produce sufficient thrust to correct this difficulty.

The X-2 is powered by a Curtiss-Wright XLR-25-CW-1 rocket engine. Described as the first throttleable rocket engine for manned aircraft, the C-W powerplant uses liquid oxygen for oxidation and a mixture of alcohol and water for fuel. With a thrust estimated at 15,000 pounds, it can, under certain conditions, deliver the equivalent of 60,000 to 80,000 horsepower.

Navy to Expand Heat Test Facilities

Industry can get a pretty good idea of the costs involved in developing design and materials combinations to cope with severe aerodynamic heating from the U.S. Navy's plans to increase the capacity of just one heat test unit at its Air Development Center near Philadelphia.

One of the best devices available today for applying a simulated heat pattern to aircraft structures and components are small (one-half-inch long) tungsten filament quartz tubes with an output of 200 watts per linear inch. Present capacity of this equipment at the Center is 4,000 kilowatts. Plans are to expand this to 30,000 kilowatts over the next five years. This is the electric generating capacity it takes to run the Pentagon where the hourly electric bill runs close to \$300.

last
000
air-
ven
ace.
the
by
1A.
Jr.,
the
with
mph.
ised
new
ary
ated
ex-
eed
icle.
data
to
was
with
con-
igh
air-
num-
per
pro-
dro-
ngs
ent

iss-
ine.
ket
-W
da-
ter
at
ain
of

dea
de-
ope
om
the
at
ila;
ble
eat
om-
g)
ith
ch.
at
are
ver
ric
the
bill

The de Havilland
Beaver
in Saudi Arabia



Indefatigable Beavers of the ARABIAN AMERICAN OIL COMPANY operate from blistering desert land in temperatures as high as 120°F. Under conditions as gruelling as those found anywhere in the world, ARABIAN AMERICAN Beavers have established an enviable record of unfailing serviceability.

F.D. Donald

Designed and Built by
THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED
POSTAL STATION "L" TORONTO ONTARIO

Western Sales and Service: Edmonton, Alta.

Pacific Coast Sales and Service: Vancouver, B.C.

OCTOBER 8, 1956

Many Space Flight Projects in Works

By ERIK BERGAUST

ROME—Although only two space flight projects have been discussed openly in the U.S., some American scientists attending the International Astronautical Federation congress here indicated there are more than a dozen projects in the works.

All of these projects, however, involve military missile technology and few details are available because of security restrictions. It is understood that many of the projects, which are in the nature of research or study programs, involve larger satellites than the Vanguard and Air Force reconnaissance camera-equipped orbiter. Also included are lunar vehicles that are to land on the moon, orbit around the moon or circumnavigate it and return to earth.

Some of the space flight projects are being conducted at universities, others at various military establishments.

• A contributing factor toward expanded research in this field is the Russian interest in aeronautics.

Prof. Leonid Sedov, of the USSR Academy of Science and Russian delegate to the congress here, admitted Soviet interest is growing and that atomic-driven rocket vehicles are being studied.

"We certainly are keeping abreast of this science, and at many scientific centers throughout my country atomic power as applied to rocket propulsion is being investigated on a large scale," he said.

• Several other behind-iron-curtain scientists attended the congress. A delegation of seven engineers from Poland handed out invitations to IAF members to attend an astronautical exhibition to be held in Poland at the end of this month. No technical papers were presented by any of the Communist delegates.

The Astronautical Commission of the Soviet Academy of Science was admitted to the IAF as its 21st member society.

"We look forward to working with the astronomical societies of the world," Sedov said.

Some 450 delegates from 22 countries convened to discuss future aspects of space flight and aeronautics. Representatives from the United States included engineers

and scientists from most of the nation's rocket and aircraft companies and from the Air Research and Development Command, the Naval Research Laboratory and the Office of Naval Research.

Among the U.S. Congress attendants were Dr. Joseph Kaplan, Chairman of the International Geophysical Year Committee; Colonel William O. Davis of the Air Force Office of Scientific Research; Professor Theodore von Kármán, NATO Chief Scientific Advisor, and Kraft A. Ehricke of Convair's ICBM division (Convair Astronautics).

• More than a dozen technical papers pertaining to artificial satellites were presented. Four papers on lunar rocket flight were presented. The American Vanguard propulsion engineers Kurt R. Stehling and Richard Foster introduced a proposal to send a four-pound payload solid-propellant rocket to the moon, using the Skyhook balloon-launching method. This relatively inexpensive launching method would make it possible to deliver four pounds of fluorescent material to the moon. Upon impact the flare of the metallic dust could be observed from the earth, the authors claim.

Robert W. Buchheim of the Rand Corp., Santa Monica, Calif., presented an interesting paper on artificial satellites of the moon. Among other significant papers was one presented by the German rocket propulsion expert Rolf Engel, who showed how it is possible to obtain almost the same efficiency with solid-propellant rockets as with liquid units.

Frederick C. Durant III of Arthur D. Little, Inc., Cambridge, Mass., was succeeded by atom physicist Leslie Shepherd of Britain as president of the IAF.

The IAF was founded in 1950. At the first congress in Stuttgart in 1951 only four U.S. delegates attended. This year there were some 70 Americans present, more than 30 of whom were representatives of ARDC.

Col. Davis said the reason for the overwhelming ARDC attendance was the fact that the Air Force is becoming more and more interested in and aware of the potentialities of aeronautics.

Next year's IAF congress will be held in Barcelona.

BuAer R&D Reorganization Aim Is Better Weapon Systems Approach

The Navy announced a reorganization of the Research and Development Department of the Bureau of Aeronautics design to improve its ability to carry out an integrated "weapon system" approach in the development of new air weapons.

The new arrangement, the Navy said, "will place greater emphasis on the research and development planning phases, strengthen project management for air weapon systems and provide more efficiency and economy through centralization."

• The BuAer shakeup is in line with the recent recommendations of the Pentagon's Aircraft Study Group (AMERICAN AVIATION, Sept. 24) which,

among other things, calls for greater control of individual Navy development projects in the hands of a single class desk officer. But a Navy spokesman said the revamped organization has been under study for a year or more, and that it did not stem directly from the Study Group's recommendations.

The principal change in BuAer's R&D Department is the formation of a new Avionics Division to be headed by Capt. W. E. Sweeney, USN. Consisting of the old Electronics and Armaments Divisions, plus the Navigation Branch of the Airborne Equipment Division, the new unit will have control over the obligation of \$50 million

in funds during the current fiscal year.

The Avionics Division will be responsible for all electronics gear for both aircraft and missiles used in locating targets, maneuvering for attack and delivery of weapons.

• BuAer set up three new positions within its R&D Department to coordinate the work of its various divisions.

The Avionics Division, together with the Powerplants and Airborne Equipment Divisions, will report to a newly established Component Development Officer.

The three divisions will also coordinate their efforts with the class desk officers of three other line engineering divisions: Aircraft, Guided Missiles and the newly-formed Aircraft Nuclear Propulsion Division.



chooses **LINK**
DC-8 SIMULATOR

Scandinavian Airlines System—the *Global Airline*—has selected Link Aviation, Inc. to build its first flight simulator for the forthcoming Douglas DC-8 airliner.

Link's amazing DC-8 Simulator will accurately reproduce the cockpit and flight characteristics of the mighty four-jet Douglas transport. SAS pilots and crews will develop

flight proficiency *on the ground*, before actual delivery of the airplane.

The new Link Simulator will incorporate up to the minute Link developments such as d-c computation, linear interpolation and automatic amplifier checking—advances which make training in flight simulators even more realistic, even better than ever before.

OTHER LINK DC-8 SIMULATOR USERS



AVIATION, INC.

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

BINGHAMTON, NEW YORK

Circle No. 9 on Reader Service Card.



101st Airborne Div.: Prototype for Mobility

By SEABROOK HULL

The 101st "Screaming Eagles" Airborne Division has been reactivated as a prototype of things to come in Army ultra-mobility.

This first concerted effort to bring Army mobility and striking power up to mid-Twentieth Century standards is significant in more ways than one: Not only does it open up the possibility of new and growing markets for aircraft and other aviation industry products, it assures the Army a more vital role in present-day strategic concepts and implies that in the future the number of men under arms will be reduced with no loss in total effectiveness.

It also means a bigger Army Air Force, including perhaps the need to raise the present 5,000-pound airframe weight limit.

The 101st today is an experimental division to test out new concepts and equipment. Based on the results, plans are to reorganize the bulk of the Army's combat divisions along similar lines. This requires development and production on a large scale of considerable equipment, both ground and air, that does not now exist, or at best is only hinted at.

* This high-mobility concept, in one form or another, is a dream that dates back to Alexander the Great and before. It took its latest coherent form back in 1951 when Frank Pace was Secretary of the Army. The idea was and still is that a division be 100% air-droppable; that its fire-power be of modern, nuclear capacity; that it be capable of jumping (literally) into combat at any point in the world within 72 hours of the fire alarm's raucous clang; that it possess the shortest in-

ternal communications channels and a minimum of "overhead" (non-combat) staff and equipment.

There were bands, flowing banners, much enthusiasm and impressive claims on the afternoon of Sept. 21 at Fort Campbell, Ky., when Army Secretary W. M. Brucker and Chief of Staff General Maxwell Taylor reviewed the Organization Day of the 101st's 11,700 men and smattering of "concept" equipment. But perhaps more symbolic of the Screaming Eagles' combat readiness was the division's mascot—a bald eagle who, perched on his standard dejected, disinterested and hooded, slept during the entire proceedings.

The 101st today is a table of organization, a body of experienced, trained men and a theory, but little more. Most of its equipment must still be delivered. Much of it is only now going into production. Some of it is still on paper.

* At a press conference during the ceremonies Secretary Brucker made the categorical statement that the 600 aircraft required to lift the division were available now. They're available, so long as SAC or the Navy or some other group doesn't require aircraft at the same time. During the conference, General Taylor stated emphatically that ". . . we don't want their (USAF's) aircraft and couldn't pay for them if we did . . ."

But many of those present responsible for carrying out the division's mission felt that, if the Army didn't own its own aircraft, there would have to be some contractual arrangement with the AF whereby a set and adequate number of long range jump aircraft would be continually available on

a 24-hour notice basis. The Army might even be budgeted to pay the AF to procure and maintain such aircraft. No matter how the details pan out, it's certain that there will have to be a lot more aircraft like the Lockheed C-130 and the Stroukoff C-123.

* Other aircraft that will be in big demand are helicopters and small liaison and short-field single engine transports. The division now has 20 helicopters as well as L-19s and de Havilland Otters and Beavers. To the Vertol H-21s, Sikorsky H-19s and Bell H-13Gs it has now, the 101st plans to add Sikorsky H-37s and H-40s and the Bell XV-3 Convertiplane. In addition a Scottish aviation Prestwick pioneer is undergoing evaluation at Fort Rucker, Ala.

A specific operational requirement is that once the division has been dropped into combat by large USAF assault transports, it be able to redeploy and supply its units by its own self-contained airpower. According to Lt. Col. Leo H. Schweiter, Division G-3, "This (requires) more and better helicopters and other short takeoff and landing aircraft . . ."

Also the Army would like to see whole companies of infantrymen individually air transportable in expendable craft like the de Lackner Aerocycle or the Hiller Flying Platform. Towards this end, three Aerocycles have been at Fort Eustis, Va., undergoing tests for some time. The Flying Platform is due for Army evaluation any day. One performed at Fort Campbell the day the 101st was reactivated.

These vehicles, however, are far from operational. The Aerocycle needs a bigger and better engine, and to provide sufficient inertial energy for

Honest John ballistic rocket, shown firing at Fort Campbell, Ky., gives Army ability to deliver atomic warheads over ranges of 30 miles with probable error of not more than 150 yards. Including a 1,500 pound warhead, missile weighs 6,000 pounds. In its full range trajectory it reaches an altitude of 30,000 feet and a speed of 1,500 miles per hour. Flame and smoke spitting out just behind warhead come from four small stability-guidance jets.





Until something better comes along, the Army figures this Lockheed C-130 Hercules transport is the "best yet" to fulfill its new mission of global ultra-mobility. Orders for the craft now exceed \$200 million.

autorotation, the blades will have to be lengthened and given a thicker chord. At least that's a guess: So far it has never been flown above the ground-effect level. And the Hiller Flying Platform, possessing no autorotational abilities, may require an extra engine for emergencies.

Currently, for tactical transport the 101st relies on C-119 and C-123 aircraft. For the latter there's a lot of enthusiasm for its heavy-load short, rough-field characteristics. Strategically, the division and all its equipment is air-transportable in either C-124s or C-130s. Like the C-123, the Army thinks the Lockheed C-130 is the "best yet," but wishes it had greater range and capacity.

* Ideally, the goal is an aircraft that can load a division like the 101st at Fort Campbell; fly non-stop half-way around the world and then spew out its men and equipment by parachute with no intermediate stop at a staging area to reload into jump aircraft. The C-130 is a close approach to meeting this requirement, but it lacks fully loaded range. However, there has been talk of equipping some C-130s as tankers and refueling in flight.

The 101st's high degree of air mobility comes from a successful major effort to get rid of all excess men and equipment and also from a high degree of weight-cutting on the equipment they must have. In the latter instance the Army has made impressive progress, but there's still a great potential in the application of airframe industry knowhow in high strength-to-weight ratio construction.

In cutting down the overhead, the 101st has been redesigned on a five-sided (instead of the traditional triangular) basis that eliminates the battalion structure. The number of trucks authorized is down to a fraction, based on the concept that the division will be delivered and maintained in combat entirely by air and that it will not remain static in any one position for very long. There is no pool of truck-drivers,

this job being filled by actual combat troops.

There are no anti-aircraft units—"We'll rely on close air support." A single repair unit is equipped and trained to handle everything and anything from trucks to howitzers. The engineering regiment's primary task is the construction and maintenance of advance air strips and its table of organization is pared accordingly.

* Nevertheless, the 101st once equipped will attain a high degree of relative combat effectiveness and will possess tremendous firepower. Of its 11,700 total authorized strength, 8,600 are actual fighting troops, compared to 17,300 and 11,300 respectively for an "old-type" airborne division like the 82nd.

The bulk of the Screaming Eagles' firepower comes from eight Honest John missile-launchers, firing either nuclear or conventional warheads more than 30 miles with an accuracy scatter factor at that range of 150 yards. Later, this will be augmented by addition of the Dart anti-tank missile, the Lacross (eight-mile range) and the Little John, both with optional atomic capabilities. Early in 1957 a self-propelled 90-mm air-droppable gun will be supplied.

Everything Air-Droppable

Right now everything the division is authorized is air-droppable, except the 21-ton Honest John launcher, but new launching equipment that is droppable will be delivered next summer. Meanwhile, it can parachute special lightweight (8 tons) bulldozers, cranes, road-scrapers, the 90-mm. assault gun, 2½-ton trucks, etc. And except for 90-mm. gun everything within the combat groups (not including engineers' equipment and rocket-launcher) can be lifted and carried by standard H-21 or H-34 helicopters.

This is the way the 101st is conceived. However, very little of this actual capability exists. The bulk of the equipment must still be delivered. And there are still bugs to be worked out.

For example, the Army wishes somebody would finally come up with a reliable release mechanism for the big 100-foot parachutes used to drop heavy equipment. In any kind of a breeze, these, if they do not quickly release after landing, will drag, tumble and wreck their load. ***

Gen. Irvine Predicts Mach 3 Turbojets

Turbojet engines capable of Mach 3 operation should be available in three or four years provided super materials become available for compressors, turbines, combustion chambers and afterburners.

This prediction came from Lt. Gen. C. S. Irvine, Deputy Chief of Staff of the USAF for Materiel. He noted that Mach 3 turbojets will require compressor discharge temperatures above 1,500°F and turbine inlet temperatures in excess of 2,500°F. To achieve these performance figures, he called for "major breakthroughs all along the line."

People who know . . .

stay at the

Hotel Lexington

HOME OF THE FAMOUS
'Hawaiian Room'

See your local travel agent or
write Kenneth M. Rogers
for Brochure 144

Near the
United Nations

LEXINGTON AVE. at 48th ST., NEW YORK CITY, 17

"NEW YORK'S FRIENDLY HOTEL"

Extensively Air-Conditioned

ALPA Denies Pilot Caused TWA Accident

CAB'S inference that "pilot error" was the cause of the April 1 crash of a TWA Martin 404 at Pittsburgh was called "completely unwarranted" by the Air Line Pilots Association.

"Uncoordinated emergency action" on the part of the crew probably caused the accident, CAB had said.

The Board noted that the copilot first observed a left engine fire warning light during takeoff and retarded the throttle to a point where prop auto-feathering became deactivated. He then reached for the manual feathering button but was dissuaded from using it by the captain who, not knowing auto-feathering was inoperative, attempted to obtain it by pulling back the left mixture control.

These measures did not comply with TWA-prescribed emergency procedures, CAB said. As a result, the windmilling left prop, extended landing gear and takeoff flaps produced sufficient drag to make the plane lose altitude and strike the ground.

ALPA president C. N. Sayen said CAB's probable cause was not supported by testimony in its own hearings and that the testimony of the surviving TWA pilots "was ignored." He re-

ferred to the possibility of autofeathering system malfunction, which ALPA feels CAB disregarded, despite the fact that such defects were found on similar planes when checked following other accidents.

ALPA is taking immediate action "to see that the facts are given proper consideration," Sayen said.

Martin XB-68 to Be Of Stainless Steel

Built to fly operationally at speeds and altitudes where aerodynamic heating will subject its skin to temperatures of 600°F. and over, the Martin Co.'s tactical bombers—now designated the XB-68—will be constructed of Armco Steel Corp. 17-7PH stainless steel. It will be one of the first all-steel aircraft to be scheduled for possible operational use. The XB-68 will be honeycomb construction from which Martin hopes to get strength-to-weight ratios at least as good as those obtained from aluminum at lower operating temperatures. At high temperatures where aluminum breaks down, it will, of course, give much better results.

Figuring with standard stagnation temperature formulae, the XB-68 structurally will be able to withstand the thermal and aerodynamic loads en-

countered at Mach 3.1 sustained flight from 35,000 feet up. But other considerations, such as engine operating temperatures, for example, limit flight temperatures. Its operational service ceiling will be over 75,000 feet, and it is supposed to have a range of 2,000 to 3,000 miles.

CAA Gets Two B-57s For Evaluation Tests

Two USAF B-57s have been loaned to CAA for high-altitude flight checks of airways and air traffic control aids.

CAA flew the two aircraft to Radiation, Inc. at Orlando, Fla., for installation of instrumentation and electronic equipment needed for the CAA evaluation program.

The jets will be based at CAA's Aeronautical Training Center in Oklahoma City where they will be flown and maintained by CAA personnel trained by the Air Force.

The jet aircraft will be used to flight-check navigation and radar facilities at altitudes up to 40,000 feet and for checking frequencies, commissioning navaids and solution of high altitude air traffic control problems.

Four CAA pilots are being checked out by the Air Force to fly the B-57s.

A TECHNICAL NEWSLETTER ON LUBRICATION WITH MOLYKOTE . . .



IF YOU
HAVEN'T RECEIVED
YOUR COPY
SEND FOR
IT
RIGHT AWAY!

Every issue features a technical article on the use of MOLYKOTE Lubricants in industry • "How-to" stories on tough lubrication applications • Filled with engineering data which applies to all industries • Being published regularly.

THE ALPHA MOLYKOTE CORP.

Main Factories: 65 Harvard Avenue, Stamford, Conn.
71 Arnulfstrasse, Munich 19, Germany

Circle No. 23 on Reader Service Card.

American Aviation Publications
Announces Its Newest Magazine

missiles and rockets

Magazine of World Astronautics

missiles and rockets deals with all vital problems involved in the field, including: Satellite science; electronics missiles airframe and power plant manufacturing; propulsion systems; liquid and solid propellants; astrionics; guidance and control systems; engineering employment; ground handling and launching equipment; basic and applied astronautical research and development.

Charter Rates (until October 15, 1956).

1 year \$4. 2 years \$6.

(Overseas: 1 year \$5, 2 years \$8).

Order from

missiles and rockets,
1001 Vermont Ave., N. W., Washington 5, D. C.

NEW

VICKERS[®]

Miniaturized
**PISTON TYPE
HYDRAULIC PUMPS**

3000 psi . . . CONSTANT DISPLACEMENT

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

**ADMINISTRATIVE and ENGINEERING CENTER
DEPARTMENT 1502 • DETROIT, 32, MICH.**

*Application Engineering and Service Offices: El Segundo, California,
2160 E. Imperial Highway • Detroit 32, Michigan, 1400 Oakman
Blvd. (Service Only) • Arlington, Texas, P. O. Box 213 • Wash-
ington 5, D.C., 624-7, Wyatt Bldg. • Additional Service facilities at:
Miami Springs, Florida, 641 De Soto Drive*

TELEGRAMS: Vickers WUX Detroit • **TELETYPE "ROY" 1149**
CABLE: Videl

OVERSEAS REPRESENTATIVE: The Sperry Gyroscope Co., Ltd.—
Great West Road, Brentford, Middlesex, England

**Engineers and Builders of Oil Hydraulic Equipment
Since 1921**

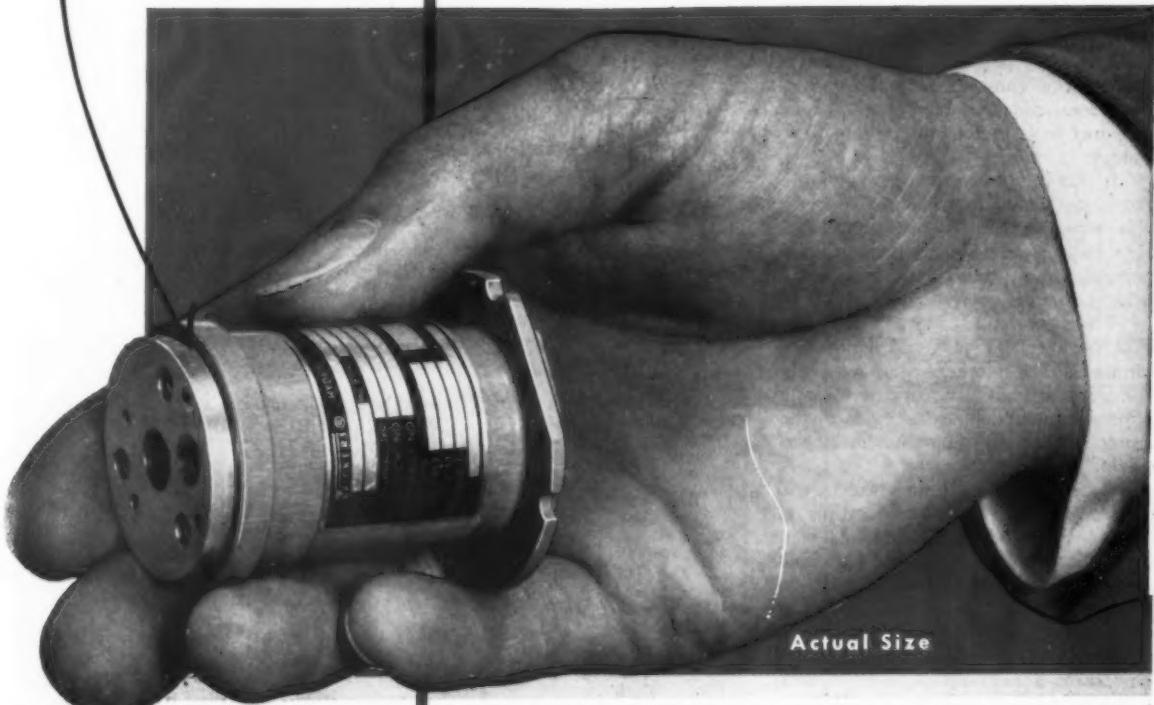
This Hydraulic
Pump has 4.3 hp
output @ 3000 psi
and 12,000 rpm.
Weight 0.9 lb.

These new miniaturized hydraulic pumps were developed by Vickers for limited life applications such as missile and ram air turbine driven hydraulic systems . . . also for motorpump assemblies, supplying emergency power on aircraft.

A distinctive feature is adaptability to manifolding and special mounting. This permits integration with the balance of a "packaged" hydraulic system to provide hydraulic power in the most compact and lightweight form yet devised. Some sizes are capable of delivering more than five horsepower per pound of weight.

Available in four size series, this miniaturized pump has the same basic characteristics as the standard Vickers piston type pump which has been establishing outstanding performance records on aircraft since 1940. Ask nearest Vickers Aircraft Application Engineer for further information.

7469



A large expansion program now in its early stages means large opportunities for additional engineers at Vickers. Write for information.

OCTOBER 8, 1956

Circle No. 10 on Reader Service Card.

35

What Labor Will Demand of Aircraft Industry in Next Two Years

By CHARLES SCHAEFFER

Aircraft industry labor leaders, representing 300,000 rank-and-file workers in the United States and Canada, have laid their cards on the table, and within the next two years management can expect an organized bid for substantial new demands, topped by a solid wage boost. That's the picture as it came into focus at the International Association of Machinists' annual convention in San Francisco.

Observers continued to trace the progress of growing unity between IAM and the powerful United Auto Workers, but with or without actual UAW support it is certain the Machinists are going to make a pitch for:

- A hefty wage increase, plus a new simplified and uniform wage system.
- Shorter hours, leading toward the coveted 30-hour week.
- An industry-wide full union shop where it is legally possible.
- Premium pay for workers stationed at desert facilities or other remote spots.
- An improved health and welfare plan covering the worker and his family completely.
- Maintenance of historical differences in rates between skilled and semi-skilled classifications by negotiating increases on a percentage basis.

These goals, mostly aired by IAM Guided Missile and Airframe Conference at Chicago last July, were boosted by a special committee at the recent West Coast conclave. Nearly 1500 delegates met to hammer out militant new strategy.

It was instantly apparent that IAM leaders are ready to back up demands with strike action, if necessary. And labor leaders were hailing the establishment of a multi-million dollars defense fund as a milestone.

The program will pay striking IAM members \$35 a week. Under an outmoded plan, workers drew a weekly \$10 when they hit the bricks. Despite a pending dues hike to finance the system, union officials were almost certain of ratification.

In most cases, union leaders will not find themselves pressed for time as they outline labor goals to locals scattered throughout the nation. The bulk of the industry is operating under recently-concluded two-year contracts. But IAM leaders will particularly push for rank-and-file approval of the proposed new wage system before sessions with management get under way in 1958.

The hard-hitting program for a

more tightly knit aircraft bargaining unit won easy approval at the convention. Besides plumping for joint UAW-IAM negotiations, delegates urged formation of councils to coordinate strategy between lodges representing workers in different plants of the same company.

Delegates also stressed the need for a simpler method of scaling wages in the industry. In airing their plans, they said: "Our experience indicates the companies have developed well-trained staffs of wage and job analysts . . . for the apparent purpose of applying the descriptions . . . to lower the straight time hourly rates."

Before members packed their bags, IAM president Al Hayes sounded the traditional warning note: "As we all know, and as has been stated on this convention floor," he said, "we don't move forward by merely passing resolutions . . ." It was a clear mandate to jump in and start swinging.

Elsewhere on the aviation labor front:

- The National Mediation Board, moving rapidly, staved off a threatened strike by members of the Air Line Pilots Association against Northeast Airlines. Although no walkout date was ever set, ALPA was prepared to support its demand for a wage boost with such action. An agreement, achieved under the guidance of a Federal mediator, however, put NEA pilots in line with the "industry average," ending the labor dispute.

- The on-and-off again negotiations between ALPA and National Airlines were scheduled to be dumped in

the lap of a fact-finder as October began. The disputants, who had been wrangling over the company's pension and insurance programs for more than a month, agreed to let David Cole, a neutral trouble-shooter, take a look at the issues.

The stormy contest at one point saw NAL furloughing its entire staff. But airline observers were really jolted when NAL president G. T. Baker threatened to sell his entire fleet should the threat of a pilots' strike persist after current mediation efforts.

- Meanwhile, ALPA and Pan American Airways asked the National Mediation Board to help get bogged-down labor talks going again. Failing to reach a settlement, the parties rang down the curtain on negotiations early in September, ALPA wants a substantial pay increase.

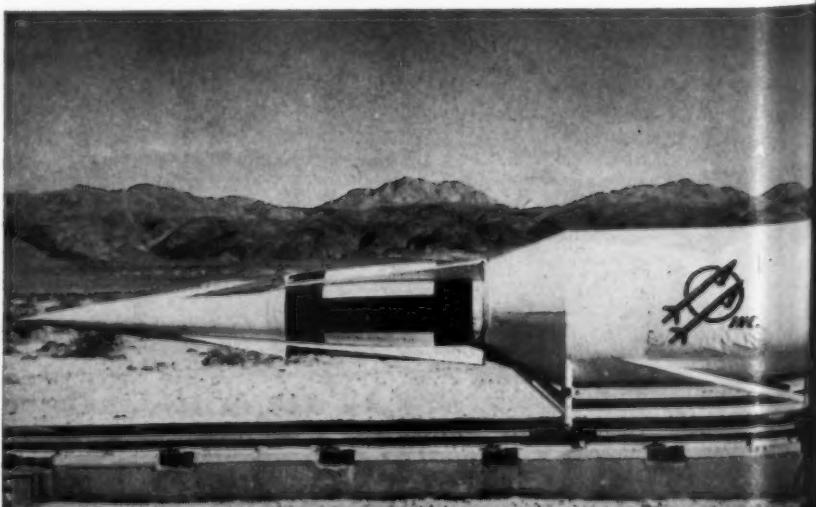
Earlier, members of the Transport Workers Union at American Airlines' Tulsa maintenance depot okayed a contract calling for a 25¢ an hour increase over the next two years. A 15¢ blanket boost will fatten pay envelopes of 3,000 Tulsa workers and others throughout the system immediately. An extra 10¢ hike will become effective next year.

E. R. Burns, president of TWU Local 514, bargaining agent for the Tulsa workers, termed the agreement "the best" they've ever had. It represents a \$6 million package for 7,500 employees over the next two years, and creates a scale ranging from \$2.76 for mechanics to \$1.78 for janitors.

- Beech Aircraft Corp. last month granted employees a package wage increase of 10.3¢ an hour and a automatic boost of 7½¢ hourly next year. Members of Lodge No. 70, International Association of Machinists, closed in all-night union session in Wichita,

1,300-mph Navy Test Sled

This rocket sled built by Aircraft Armaments, Inc., Baltimore, attained a speed of 1,300 mph in 2.5 seconds during recent tests at Naval Ordnance Test Station in California. Device is used to test operation of components at high speed. Sled is powered by three solid-propellant rocket motors.





From Tokyo to Thule the Air Force meets the Solar Serviceman

GAS TURBINE ENGINES are gaining ever wider use in military service . . . for airborne generator sets, ground support units and many other applications. Solar Field Servicemen constantly visit Air Force bases and Armed Service evaluation centers establishing training programs and checking installations. Solar's Field Servicemen are a vital part of the team that has produced the trouble-free record of Solar gas turbines.

Solar builds both the Mars 50 hp and the Jupiter 500 hp gas turbine engines. The Mars is now in use on the Lockheed

C-121C, Douglas C-124C, Convair C-131B and the Boeing KC-97 tanker. The Jupiter is being produced as a compressor pack and in variable and constant speed versions for other applications.

The proven dependability of Solar gas turbines is the result of nearly three decades of experience in engineering and fabricating precision products of alloy steels for severe service. Can this experience help you solve a complex engineering or manufacturing problem? For information write Dept. C-82, Solar Aircraft Company, San Diego 12, California.

WRITE FOR BOOKLET...new brochure describes Solar gas turbines — how they work, advantages they offer to forward-looking industries. Send for a copy today.



ENGINEERS WANTED Unlimited opportunities in Solar's expanding gas turbine program! Write today, giving experience.

Designers, Developers and Manufacturers • Gas Turbines • Aircraft and Missile Components • Bellows • Controls • Coatings • Metal Alloy Products

Here's why the Scott OXYGEN CONSOLE is standard on the new



Aero Commander 680



★ COMPLETE. Fixed oxygen system supplies as many as five persons — more with dual manifold plugs.

★ SIMPLE TO USE. Set at cruising altitude and plug in masks. Each outlet is an ON-OFF valve.

★ LIGHT WEIGHT AND COMPACT. Measures 7½" x 8" x 1½". Weighs only three pounds. Fits anywhere in the cabin of the airplane. Does not require valuable instrument panel space.

If you do not have Scott Oxygen Console equipment, write today for complete information. Please specify your aircraft.



SCOTT AVIATION CORP.

212 Erie Street, Lancaster, N.Y.

Export: Southern Oxygen Co.
15 West 57th Street, New York 19, N.Y.

Circle No. 12 on Reader Service Card

38

finally okayed the company offer.

An internal dispute over whether or not to accept Beech's incentive wage scheme, apparently provoked the marathon session. In the end IAM accepted a deal incorporating an automatic "wage reopeners" when and if incentive wages fall from the present level of 6.8% to 4.8%.

* The Federal Mediation Service in mid-summer averted a threatened strike by members of the International Association of Machinists working at the Boeing Airplane Co.'s Wichita plant. The agreement, which erased the scheduled walkout, provides for an immediate 5% wage boost and another 7¢ an hour next year.

The IAM marked as its chief victory changes in the Employment Performance Review System. Among these, an IAM spokesman said, were elimination of attendance as a factor in review; provision for employee comment on the form, and the shifting of responsibility of the review to the worker's supervisor.

IAM also won a modified union shop under a maintenance of membership plan. Other benefits include three weeks' vacation or 120 hours pay for 20-year service workers and a version of jury pay.

* Almost simultaneously, union members at Liberty Products Corp., a Farmingdale (L.I.) manufacturer of airplane parts, were trumpeting news of labor gains—including the first union shop in the local's history.

The two-year agreement opens the way for an immediate wage hike of 8¢ an hour for 1,900 employees, plus another 6¢ next June. Included among other benefits are strengthened security, better layoff and upgrading protection, more sick leave and broadening of accident and disability awards. Hourly workers averaged \$2.24 at Liberty before recent negotiations.

* In Miami, the IAM was paving the way for an unprecedented union demand for a 30-hour week for airline employees. Eastern Air Lines opened negotiations with the union late in July on a contract covering 4,000 workers. A Federal mediator was striving for a settlement as the deadline loomed.

Union officials, it is known, will not accept a pay cut to win the shorter work week. In fact, IAM announced it will seek an 8% wage hike to elevate basic pay for EAL mechanics to \$3.50 an hour.

* A strike of 2,000 employees of Solar Aircraft Co., Des Moines, flared early in July. Although IAM was seeking a 20¢-an-hour wage boost, the walkout was touched off, apparently, by the grievance discharge of an employee.

Besides the immediate pay hike, the union wanted another 10¢ increase in June 1957, and changes in overtime pay and sick leave qualifications. The strike followed some 43 negotiation sessions, an IAM spokesman said.

A trio of Federal mediators finally negotiated an agreement calling for a 17¢-an-hour increase and other new benefits.

* Meanwhile, Link Aviation, Inc., Binghamton, N.Y., disclosed its employees had voted to reject a bid by the IAM to organize the plant.* In an election supervised by the National Labor Relations Board, 96% of the company's 1,160 production and maintenance workers thumbed down IAM by a count of 807 to 280.

* The IAM suffered another, but less overwhelming defeat at the hands of Kaman Aircraft employees who turned down the union by a vote of 237 to 209. It was the third time in four years Kaman workers have spurned the IAM.

* In the midst of myriad industry-wide negotiations Convair signed a two-year agreement with the Engineers and Architects Association in San Diego, providing wage increases of 5% to 6% for hourly employees and 6% for salaried employees. The contract, which will expire May 15, 1958, provides additional boosts for employees next year.

* The IAM local at Menasco Manufacturing Co. also voted to approve a two-year contract calling for an increase of 14½¢ an hour and an extra 7¢ next year. ***

Wayne Weishaar Dies in Washington

Wayne McIntire Weishaar, 60, secretary-treasurer of the Aeronautical Training Society, died Sept. 25 in Washington.

Well-known in both aviation and newspaper circles, Mr. Weishaar was a native of Rhodes, Iowa. He began his newspaper career in 1919 as a reporter for the *Des Moines News*. He later was with the Associated Press and the *Des Moines Evening Tribune*. In 1926, he became city editor of the *Des Moines Register* and from 1929-1935 was aviation editor of the *New York Herald Tribune*.

He later became a publicity writer for the Warner Brothers studio, then a free lance writer. In 1943, he joined the Aircraft War Production Council in Los Angeles as a writer. He joined the Aeronautical Training Society as information director in 1943 and two years later assumed the position he held at his death.

He is survived by his wife, Iris Rounsville, and a son, Sumner Wayne.

AMERICAN AVIATION

How Collins' Anti-Collision System Works

Proximity warning equipment approved by Air Transport Association should be available within 12 to 15 months.

By HENRY P. STEIER

A system that detects and displays the presence of collision-threatening aircraft may be available within a year to 15 months.

This is time schedule set by the Collins Radio Co. for development of a system based upon an engineering proposal to the Air Transport Assn. (AMERICAN AVIATION, Sept. 24, p. 18.)

A special committee established by the association a few months ago received 20 proposals from electronics firms. At the conclusion of its review, the committee decided the Collins idea was "the most satisfactory of proposals developed so far."

Ten Proposals Studied

According to ATA, 10 out of the 20 proposals were selected for study. First to submit a proposal was the Ramo-Wooldridge Corp. However, its proposal was handicapped by an R-W request for \$750,000 to back the development project.

Status of the R-W proposal was originally thought by industry observers to be in the hardware stage. But, in a recent interview with AMERICAN AVIATION, Dr. Dean E. Wooldridge, president and treasurer of R-W, said it was not that far along.

Questioned on whether the idea was in "circuit diagram form" or in "hardware," Wooldridge said it was somewhere between the two, more nearly described as the breadboard stage.

* A recent report that Ramo-Wooldridge would neither confirm nor deny, which appeared in a west coast newspaper, described the R-W equipment.

Reportedly, the R-W unit functions independently of other aircraft, is radar-controlled and weighs 75 pounds. It was said to provide both visual and audio signals in the cockpit of an aircraft when another plane is in the vicinity.

* An R-W spokesman told AMERICAN AVIATION the financial proposal made by R-W called for return of some of the money to the airlines as mark-downs from actual equipment cost when it was finally accepted and delivered.

In a statement made after its decision favoring Collins, ATA said the committee "expected several of the manufacturers who submitted proposals

will be able to offer equipment for use in the not too distant future."

Other companies whose proposals were studied by the special committee were:

Bendix Aviation Corp.'s Radio Division, Radio Corp. of America, General Electric Co., Sperry Gyroscope Co., Avco's Crosley Division, Federal Telecommunications Laboratories, Hughes Aircraft Co. and Nevada Air Products.

American Airlines is now working closely with Collins and plans to use the proximity warning and display equipment in its fleet when the system becomes available.

Editorial Note: A request from some airlines for 400-ft. proximity indication has been accepted by Collins Radio Co. This change from the original proposal means 400-ft. display lights would be added for above-below and flight-plane proximity indication.

* The Collins proximity warning equipment (PWE) design provides two functions: (1) It will detect and inform the pilot by instrument when any aircraft comes within an 800-foot radius of the PWE-equipped aircraft. (2) It will detect and indicate any intruding plane that enters the flight plane at any point 360 degrees around the equipped aircraft.

In the first function, the volume

of space covered can be represented by two hemispheres covering 165 degrees above and below the plane. The indication will continue until the detected object goes beyond 800 feet or is within 200 feet. The 200-foot minimum is to be set so that the detecting plane's own wingtips and tail assembly do not appear as spurious signals.

In the second function, the range of detection of any intruding plane in a four-sector, 360-degree pattern would be two miles, with provision for switching to a limit of 800 feet for this part of the system. This limit would be used in terminal operations to reduce "clutter" from aircraft at greater ranges.

* The instrument display proposed is a lamp-type display. Twelve lights symmetrically arranged in the shape of a cross, with three lights on each arm, would indicate 800-feet, one-mile, or two-mile intruding plane distances.

The four arms of the cross would represent fore, aft, left and right positions of the intruder. Arranged in the 90-degree segments formed by the cross would be four pie-shaped segment lights to indicate intruders above and below.

Although there are four above-below segment lights, no indication of

(Continued on Page 42)



Antenna patterns for Collins Radio Co.'s proximity warning radar systems. Spherical pattern at center of illustration covers 165 degrees above and below the plane, and detection range is 800 feet to 200 feet. Detection in flight plane would be covered by four-sector pattern shown. These cover 90 degrees in the azimuth plane and 15 degrees in elevation plane. Range is up to two miles.

RCA announces a new system of radio avoidance

for installation in aircraft where weight,
space, and power are at a premium.



Address Inquiries to
CUSTOM AVIATION EQUIPMENT
RADIO CORPORATION of AMERICA
11819 W. OLYMPIC BLVD., LOS ANGELES, CALIF.

a new weather radar, the AVQ-50



Indicator—actual size for Standard Instrument-Panel Mounting



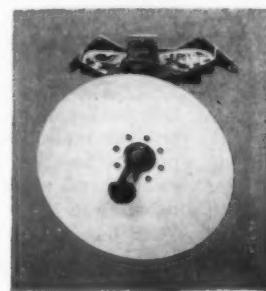
Accessory Unit



Receiver-Transmitter

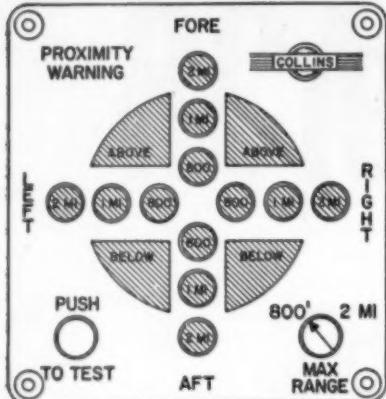


Antenna



Typical Antenna Installation
in Beech D-18





Proximity warning display. Position and approximate distance of intruding aircraft are shown. Range switch permits limitation to short range for terminal operations.

above-left, above-right, below-left, below-right is planned now. The two "above" lights would operate simultaneously as will the two "below" lights.

The flight-plane antenna orientation would be arranged so that the forward antenna would cover 45 degrees each side of the plane's longitudinal axis, and thus "scan" a 90-degree quadrant ahead of the plane.

Three other antennas would cover the three other flight-plane segments and two antennas would cover the upper and lower hemisphere hemispherical space.

Flush-mounted antennas are the type being considered. External antennas on high-speed aircraft are unsatisfactory because of the high-drag factor they add. Slot or printed circuit type dipole antennas with a small reflecting cavity behind them seem to offer the best prospect for adoption in the proximity warning equipment.

FM-CW Radar

Collins has chosen a form of frequency-modulated continuous-wave radar for its PWE. This is the simplest system that will give range information directly without need to resort to a cathode-ray tube indicator or a computer.

The PWE will operate in the "S" band near 3,000 mc. Although a higher frequency would permit smaller antennas, which must be kept to minimum size, the effect of rainfall on a higher frequency system is of greater importance.

* At shorter wavelengths radar observes rainfall. This is undesirable in the PWE system, which must penetrate rain to observe other aircraft.

At the same time, the resolving power at the wavelength chosen must be "fine" enough to detect the smallest aircraft expected to be encountered. "S" band radar will do this.

Collins studies showed a minimum target area of 40 sq. ft. is about the smallest that will be encountered. This is the head-on area of a jet fighter. Small propeller-driven aircraft have a head-on area of over 150 sq. ft.

* Frequency modulation will be obtained from a 400-cycle sweep rate with sawtooth configuration. This type of FM rises in frequency with time and has a number of advantages over a pulse type system.

An FM radar has an inherent capability to reject interfering signals from other aircraft carrying PWE. Another factor that increases this capability is cross-polarization, which will be used for the antenna system.

Feed-through from outgoing signals to incoming signals using the same antenna have been a drawback to use of FM radar. Collins feels that by using cross-polarization through utilization of rectangular waveguides behind horn antennas for the four-quadrant flight-plane system, a single antenna can be used for each quadrant.

Another advantage appears with cross-polarization in that signal reflection from raindrops is reduced when the polarity is switched in this way.

* Another primary consideration in choice of FM radar is the very short ranges at which it will operate. These run down to 200 feet. Extremely short pulses for a pulse radar system would be needed to achieve this short-range resolution.

FM radar permits rapid extraction of range data. This is especially important at short ranges. It also permits rapid extraction of speed data which will be needed in an "ultimate" system.

The Doppler effect in which the frequency of the reflected wave is changed by an amount proportional to the relative speed of the detected object becomes important in a collision avoidance device.

Collision Avoidance

The PWE equipment to be built by Collins represents Phase I of a two-phase program. Phase II will be development of collision detection and avoidance equipment. For that reason certain considerations have been given in development of Phase I equipment that will apply to Phase II. An orderly transition with minimum obsolescence of equipment is desired, so the ultimate equipment becomes a very important factor to design of PWE.

* The plan for PWE at this time calls for a power of 100 watts, a 1-ATR box for transmitter and receiver components along with the antenna lobe switch and power supply. Estimate for weight of the box is 55 pounds. Four hundred cycle ac power will be used, with 550 volt-amperes needed.

Receiver and indicator circuits will be transistorized where possible, in accordance with Collins policy. Modular units and printed wiring will be used where practical. The indicator unit is designed in a standard 5 x 5 1/4-inch instrument case.

Because continuous wave magnetrons that can be frequency-modulated are now available with 100-watt output, that limit was chosen. However, from the standpoint of supply power needed, size, weight, and heat, 100 watts should be the maximum, according to Collins.

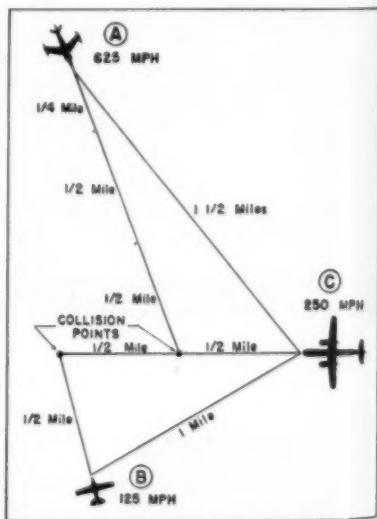
* Solution to the collision avoidance problem involves much more than mere indication of a potential collision hazard.

Timing Vitally Important

The pilot must be told of the hazard and instructed to execute an escape maneuver that will insure avoidance of the collision. The warning and instruction must be given soon enough to permit the necessary action.

The escape maneuver specified by ATA calls for a left or right turn with a maximum bank angle of 45 degrees. This puts a 1-g acceleration on the passengers. This maneuver does not disturb traffic at levels 1,000 feet below or above the aircraft.

* ATA has indicated a minimum allowance of one second for pilot reaction time. This means three seconds must be allowed, after an alarm is shown, for the establishment of the lateral acceleration of the turn. Collins says it can be shown that at least 15 seconds warning time is required to



Typical problem that must be solved by collision detection and avoidance equipment being considered. Angles of approach and closure times become important information that needs rapid computation to advise pilot on what positive evasive action must be taken.

FACTORY AUTHORIZED DISTRIBUTORS

For Pratt & Whitney Aircraft Engine Parts



Wherever you fly in the United States—North or South, East or West—you are within easy reach of a factory-authorized distributor of Pratt & Whitney Aircraft engine parts.

These approved distributors keep adequate stocks of up-to-date P&WA factory parts. They have facilities, highly skilled personnel, and all current P&WA instructions to meet your maintenance and overhaul needs.

For factory-fresh parts and skilled service to insure the best performance from your Pratt & Whitney engine, see these P&WA distributors:

PACIFIC AIRMOTIVE CORPORATION

* Burbank, Calif.

Branches at:

- Boeing Field, Seattle, Wash.
- Municipal Airport, Oakland, Calif.
- Stapleton Airport, Denver, Colo.

SOUTHWEST AIRMOTIVE COMPANY

* Love Field, Dallas, Texas

NORTHWESTERN AERONAUTICAL COMPANY

* Holman Field, St. Paul, Minn.

AIRWORK CORPORATION

* Municipal Airport, Millville, N. J.

Branches at:

- Airport, Newark, N. J.
- 814 N. Main St., College Park, Ga.
- 5245 Northwest 36th St., Miami, Fla.
- 5821 Seminary Road, Baileys Crossroads, Alexandria, Va.



**Pratt & Whitney
Aircraft**

Division of United Aircraft Corporation
East Hartford, Connecticut
Circle No. 14 on Reader Service Card.

OCTOBER 8, 1956

insure safe execution of an escape maneuver.

* Under conditions involving jet transports and high speed military aircraft, the warning must be sounded when the aircraft are 25,000 ft. apart. Measurements must then begin at ranges up to 35,000 ft. to allow a second or two for measuring and computing.

Miss-distance has been tentatively established at 800 ft. or more. To meet this imposing specification, Collins says it will be necessary to measure a rate of change of angle of a few minutes of arc per second, or radial accelerations of about 0.1 ft.-sec.²

The effects of atmospheric turbulence on motion of the aircraft and the intruder will amount to more than values of angle measurement to be read. Gyro stabilization might aid if a tracking radar were used, but this type of system cannot maintain all-angle vigilance and so is not applicable.

* Another approach considered was use of an interferometer-type antenna system. This uses antenna elements widely spaced on the aircraft. It would permit sensing of fine angular movements. However, movements of the carrying aircraft confuse its sensing and, if placed on the wings, flexing of the wings affect the measurements.

It is expected that antennas developed for the PWE will be used with the collision avoidance system. However, Collins needs to do a thorough study of some basic matters before Phase II equipment is developed.

According to Collin's report on its work, a search of the literature has revealed little information on the response of an airplane to atmospheric turbulence. Examination of the problem was done by Collins with an analog computer and will continue.

Thorough Study Needed

* A thorough analytical study of the escape maneuver is needed and will be done using a digital computer. Miss characteristics for all the various combinations of approach circumstances will be made to insure that no hazardous situation is overlooked.

Another problem is that random motions of the intruding aircraft cause the phase of the radar signals reflected from it to appear as a randomly changing position of the intruding aircraft. This effects determination of radial acceleration.

Until these studies are completed, the choice of system parameters cannot be made for development of a collision detection and avoidance system that satisfies present "ultimate" demands on it.

Throughout the West



PAC...The only "factory approved" engine overhaul shop in the 11 western states

For fast, efficient service, bring any Pratt & Whitney Aircraft engine—from the crop duster's favorite, the "985," to the "4360"—to PAC, the country's largest and oldest engine overhaul facility.

Facilities to handle the "J-57," the overwhelming choice of the jet transport field, will soon be available.

**We Proudly Display
the Pratt & Whitney
Aircraft Emblem**



Call on PAC for Pratt & Whitney Aircraft approved parts...

Lockheed Air Terminal, Burbank, Calif.

Oakland Municipal Airport, Oakland, Calif.

Boeing Field, Seattle, Washington

Stapleton Field, Denver, Colorado



**PACIFIC
AIRMOTIVE
CORPORATION**
2940 North
Hollywood Way
Burbank, California

Electronotes

* Electronic component survey made by Los Angeles Chamber of Commerce showed 65 percent of the components used by LA's industry came from eastern and mid-western manufacturers. Transportation lead time and inadequate vendor liaison, resulting from remote purchases, are considered a handicap. Local firms say engineering and production of such items are needed in Southern California.

* Transistor reliability has been an unknown quantity. Recently the General Electric Co. announced replacement may never be necessary if units are used within limits. GE reported life tests on randomly selected units showed no failures after 18,000 hours' operation. This is equal to eight hours a day for six years, and they still act like new. One-quarter of one percent of 2,050 units life-tested could not be operated at peak power after 1,000 hours at full power.

* Westinghouse has announced a 250-degree centigrade temperature capability for its new silicone resin for transformer insulation. A conventional aircraft transformer was reduced from nine pounds to four and one-half pounds. The average aircraft carrying 100 pounds of transformers would save 50 pounds using such units.

* Sperry Gyroscope Co., division of Sperry-Rand Corp. has developed a Gyrosyn Compass System with a drift rate of less than three degrees per hour. Usual drift is up to eight degrees in that time. Included is automatic compensation for latitude. At latitudes above 65 degrees, where magnetic com-

passes are unreliable, the gyro can be unslaved to operate freely and still provide accurate information. The unit will be used in Sperry's SP-10 flight control system for jet transports.

* Navy announced reception of radio signals from Mars was detection by a 600-inch radio telescope of 3-centimeter waves. The signals are related to the surface temperature of the planet and indicated average temperatures there to be slightly lower than the freezing point of water.

* Republic Aviation Corp.'s vice president and chief engineer, Alexander Kartveli, has been named v.p. in charge

of research and development covering planes, missiles, weapons systems, atomics, nucleonics, etc. Richard G. Bowman was advanced to chief engineer in charge of production and experimental engineering, and Dr. William O'Donnell was named chief engineer in charge of plane and missile development.

* Ryan Aeronautical Co. received a USAF contract to study cockpit arrangement and instrument display requirements for vertical takeoff and landing aircraft. Contract calls for a report describing optimum cockpit and instrument arrangement plus a mockup incorporating these arrangements.



Dear Kitten:

It occurs to me—as I cruise along dictating this epistle to my homely copilot (his shorthair is lousy)—that the time has come when you must stop playing Tricks or Treats on Halloween. Last week at home, I noticed, in a fatherly kind of way, that you have—er—ah—developed to the point where you must cease galavantin' up and down the street after Taps.

In any event, whatever you do, don't go Trickin' or Treatin' at 1313 Livitupp Lane where that bachelor advertising man, Hamilton Droolmore, lives! Working on the Southwest Airmotive account may have affected his mind.

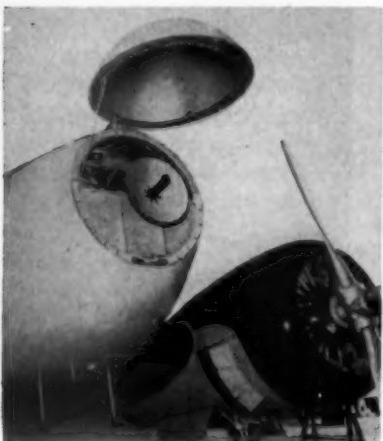
I'm en route to the National Business Aircraft Association convention, October 23-24-25 at Miami and my airplane, as usual, is flyin' smooth as silk. Southwest Airmotive, pushing closer to its Silver Jubilee in '57, uses no Tricks—just skill and reliability—in Treatin' me and other business pilots to flying's most experienced service. And, for the biggest Treat of all, SAC is under way full-speed building its great, new \$2,000,000 business aircraft terminal. Here is proof to NBAA and everyone that SAC is no Johnny-Come-Lately, but that it has faith in business flying—and has kept this faith for a Quarter Century.

—And I've got faith in my 19-year-old, 5'3", 110-lb., red-headed, blue-eyed daughter. Don't you have ditto in Mr. Droolmore.

Love,
Daddy



RCA Weather Radar



"Flyweight" weather-avoidance AVQ-50 radar developed by the Radio Corp. of America weighs 50 pounds and uses antenna shown installed in twin-engined business aircraft. Range is 50 miles. Antenna can be tilted for terrain mapping.

SOUTHWEST AIMOTIVE CO. • LOVE FIELD • DALLAS, TEXAS

Circle No. 16 on Reader Service Card.

X-Ray on Wheels Cuts Checking Costs

Douglas Aircraft's Long Beach Division has devised a versatile mobile X-ray unit that cuts time and manpower for post-production checks by as much as 50%.

On the RB-66 Air force twin-jet bomber, an X-ray crew now shoots some 178 closed-area X-rays on each production aircraft. Douglas figures the mobile unit takes three men six hours to complete a job which formerly called for five or six men up to 12 hours.

The X-ray not only detects debris and any foreign material in inaccessible areas of the jets and turboprops, but also detects mechanical and structural defects that might prove unsafe once in operation.

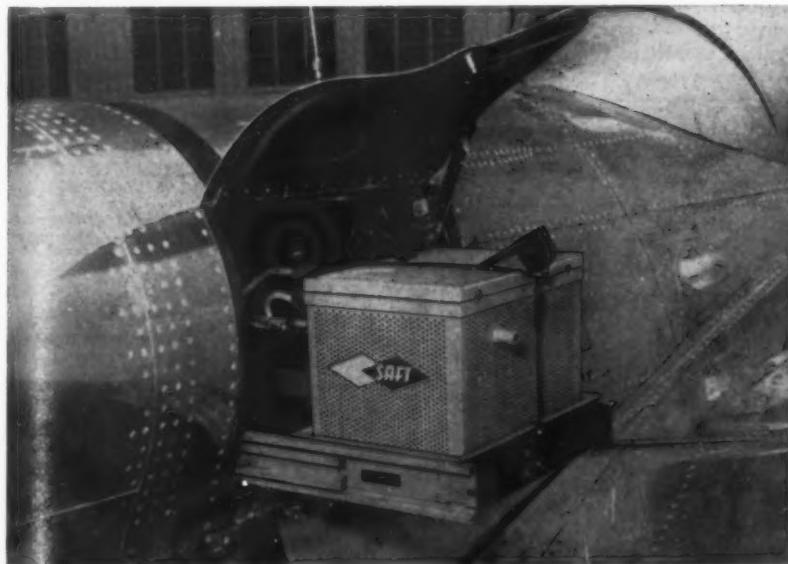
* Idea for the mobile unit was a four-man proposition. Collaborating in its development were E. W. Makin—quality control chief; W. F. Stryker—asst. chief inspector; D. G. Brusse—inspection project head, and F. L. Clark—non-destructive test foreman.

Final design was handled by facilities engineer M. G. McCarney. Three manufacturers contributed to its construction.



X-ray unit is a 160-kv machine with a hydraulically-operated telescoping mast used to carry the X-ray tube head. By remote control from the truck panel, mast can be raised up to 40 ft. and the retracting boom extended 10 ft. through a 360-degree swing for complete accessibility to any area of the plane.

Beech, Temco Trainers To Use Saft Batteries



Saft nickel-cadmium battery installed in Temco Model 73 two-place jet trainer.

Two new jet trainers, the Beechcraft Model 73 and Temco Model 51 are being fitted with nickel-cadmium batteries instead of the conventional lead-acid type.

The new Voltabloc battery, originally developed in France by Societe des Accumulateurs Fixes et de Tra-

tion, will be produced by Saft Corp. of America at Lodi, N. J.

New battery for the Temco trainer, designated TT-1 by the Navy, will be a 24-volt-22 ampere-hour model to be used to start TT-1's Continental YJ69-T-9 jet engine. It will also serve as a standby electrical source in event of

starter-generator malfunction.

The Beech Model 73, also powered by the J69, will use a similar Saft battery.

Rubber O-Rings Reduce Erosion, NWA Finds

A simple suggestion for the use of a rubber O-ring on Pratt & Whitney R4360 engines is paying big dividends at Northwest Airlines.

NWA officials figure the idea is saving about \$12,000 a year in reduced erosion on R4360 engine cases, a factor that virtually eliminates the repeated return of these parts to P&W for repair.

The suggestion also brought a \$1,200 award to its originators, mechanic E. A. Jorgeson and inspector C. J. Lorsung of Northwest's St. Paul overhaul base. It's the highest ever paid under the airline's suggestion plan.

Until Lorsung and Jorgeson came up with the answer, NWA faced a major problem with engine case erosion at a point where it contacted metal-alloy camshaft liners. Oil fed to the cam-shaft through the liner at 75 psi pressure tended to work itself between the liner and case and resulted in erosion of the softer engine case material.

The O-ring proposed by the two mechanics seals off this area. Whereas NWA had to remove erosion at each overhaul, this portion of the engine case can now be used indefinitely.

Solving Shipping Problem

Pan American World Airways' Miami overhaul base has found an inexpensive solution to a costly problem traced to long-distance truck shipment of engines.

The problem—vibration damage to main bearings of its Wright R3350 EA and DA Turbo Compounds while en route to and from overhaul.

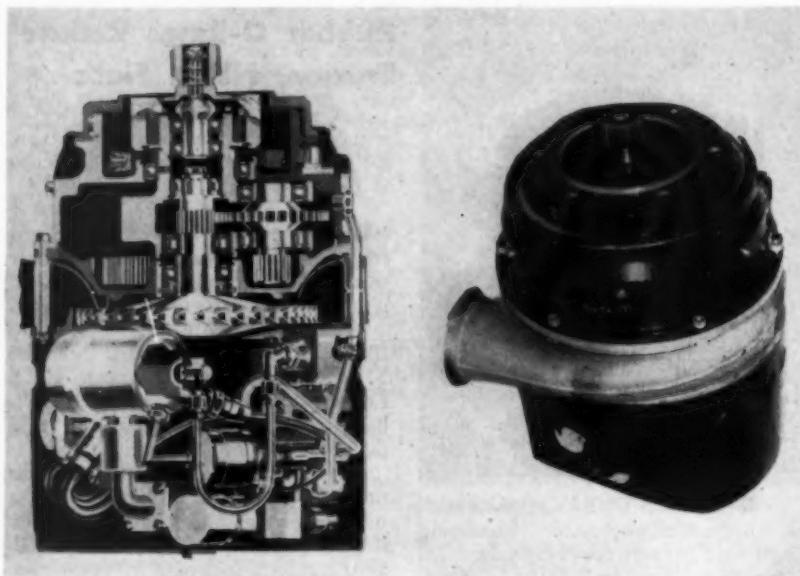
PAA's S. W. Strama, superintendent of the Miami component overhaul shop, came up with the answer. It's a bungee (shock cord) used to pre-load the engine after mounting on a shipping dolly.

The snubbing kit consists of 20 feet of $\frac{3}{8}$ " bungee that is fed into the R3350's No. 2 cylinder with the piston in bottom position. When all but a few inches are forced in place, the engine is turned counter-clockwise as far as possible, compressing the bungee.

Then, a torque arm is placed on the prop shaft and attached to a turn-buckle with 43 inches of $\frac{3}{4}$ " bungee that has been wrap-spliced into two coils. Tightening the turn-buckle until the clevis pins on the torque arm and turn-buckle are 17" apart places a 1,000-pound preload on the crankshaft.

New Products and Processes

FUEL-AIR TURBOSTARTER



General Electric Co. has developed a miniature gas turbine weighing only 46 lbs. that can start large aircraft gas turbine engines within 20-25 seconds and will permit jet planes to operate to and from airports where no ground support is available. It is 12 $\frac{1}{4}$ " long and 8 $\frac{3}{4}$ " in diameter.

The AS-18 Fuel-Air Turbostarter works on the same principle as the large engines it starts. It operates by

Circle No. 164 on Reader Service Card.

HYDRAULIC MOTOR

New York Air Brake Co., Watertown Division has introduced a series of constant-displacement, axial piston-type hydraulic motors for 3,000-psi aircraft systems.

New 54F series is being produced in eight sizes ranging in displacement from 0.1 to 1.0 cubic inches. They are intended for continuous-duty, intermittent or continuously reversing cycles.

Motors are of the nine-cylinder type using valve pistons in the same bore



taking high-pressure air from an airborne bottle (or ground supply when available), mixing it with fuel drawn from the main tank of the aircraft and then igniting the mixture. Resultant gases spin a small turbine at high speed.

The turbine is connected through reduction gearing to the main engine shaft to accelerate it at speeds required to sustain combustion.

with the driving pistons. They deliver about 180° of power during each cylinder revolution.

Operating characteristics of the 54F motors feature high acceleration. For a 0.6 cu. in./rev. motor, acceleration is 1.35×10^5 radians/second² at 3,000 psi. Acceleration time of the motor is .00078 sec. per 1,000 rpm, only slightly more than 3/10,000 of a second to bring the motor to top speed.

Circle No. 160 on Reader Service Card.

BOMB-BAY DOOR SEALS

The Connecticut Hard Rubber Co. has developed bomb-bay door seals for the Boeing B-47 constructed of white silicone rubber with a bonded .008"-thick Teflon cover. Formerly the seals were made of Neoprene rubber.

The silicone rubber seals are said to insure aerodynamic smoothness at the closure between the bomb-bay doors and to keep moisture from entering the bomb-bay area. They provide flexibility from -100°F to 500°F and immunity to ozone and weather cracking.

Circle No. 166 on Reader Service Card.

FLOW RATE INDICATOR

Fischer & Porter Co. has developed an inexpensive flow rate indicator for use with its turbine-type primary metering elements.

Called the Industrial Logarithmic Panel Indicator, the unit converts the output signal of the turbine meter into a series of pulses of constant amplitude at a frequency signal equal to the turbine meter's output and therefore proportional to volumetric flow rate.

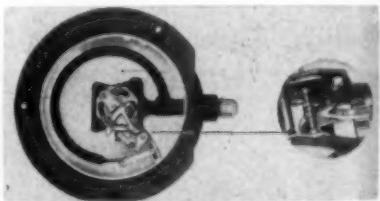
The pulses are integrated in a dc milliammeter, providing an indication proportional to frequency and hence to flow rate. A shaded pole panel meter with a logarithmic characteristic is employed to provide uniform rate accuracy of 2% at a short-term repeatability of 0.5% of rate.

Circle No. 150 on Reader Service Card.

PRESSURE GAUGE

Norden-Ketay Corp. has developed a series of pressure gauges that incorporate a new concept in transmitting linear motion.

Trade-named Bandrive, the gauges are said to offer longer life, greater accuracy and increased reliability. Deflection of the Bourdon tube or pressure cell is transmitted to the indicating pointer of the gauge without



gears. The basic movement eliminates the gear rack, pinion gear and hairspring assembly generally found in conventional gauges with geared movements.

Heart of the gearless movement is the patented long-deflection constant-force spring. As in conventional movements, the pressure cell actuates the sector through a connecting link. But the motion of the sector is transmitted to the pinion through the patented band. The transmitted motion is converted to responsive pointer rotation in ratio of pinion radius to sector radius.

Circle No. 158 on Reader Service Card.

TEFLON GROMMETS

Kelon-T (Teflon) grommets fabricated by Shamban Engineering Co. are used in buffet assemblies made by Weber Aircraft Corp., primarily because they do not chafe the electrical wires that pass through them. Rubber-coated metal grommets were formerly used.

Kelon-T grommets are easy to snap

into place, have high dielectric strength, are resistant to the chemical action of foods and maintain their natural slipperiness and hardness even under high temperatures, according to the manufacturer.

Circle No. 190 on Reader Service Card.

LIQUID OXYGEN CONTAINER

The Aro Equipment Corp. has announced a 5-liter liquid oxygen container, Model 14460, of the capacitance liquid-level gauging type. The container is being supplied in production quantities to North American Aviation, Inc. for use on its FJ-3 and FJ-4 Navy interceptors.

Where other gauging systems measure the head of gaseous oxygen in the bottle, the Aro unit uses probes to measure the liquid level and thereby is said to achieve a more accurate reading. It is based on the same principle as fuel gauges and operates on 110-volt, 400-cycle ac input.

The container weighs approximately 10 lbs. and can be used on pressure systems of 70 psi or 300 psi.



Circle No. 155 on Reader Service Card.

PITOT-STATIC PROBE

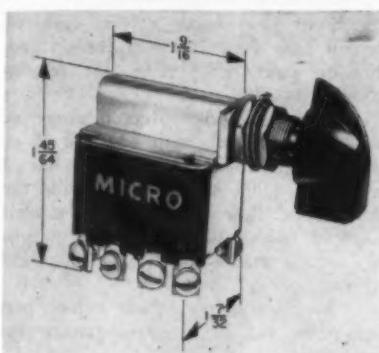
Consolidated Avionics Corp. is producing a pitot-static yaw and angle-of-attack probe calibrated for performance at least through Mach 2.5.

Originally designed by the National Advisory Committee for Aeronautics, the probe has been used for testing aircraft such as the Bell X-2. Its mechanical construction has been modified to facilitate mechanical construction, without affecting the calibration. First production shipments were made to Republic Aviation Corp.

Static pressure error at a yaw and attack angle of zero is positive and varies linearly from approximately 4% of the free stream impact pressure at a Mach number of 0.60 to about 1% of the impact pressure at Mach 0.99.

Circle No. 156 on Reader Service Card.

ROTARY TOGGLE SWITCH



Micro Switch, a division of Minneapolis-Honeywell Regulator Co. has introduced a rotary toggle switch that is said to solve the problems of controlling many circuits with a single-motion, mechanical actuation.

The switch, designated 4TRI, can handle a high electrical load, eliminating the use of relays and other electrical devices. It is a four-pole, double-throw switch, maintained in all three actuation positions: on-off-on. It has 12 terminals. Other models with up to 24 terminals (8 poles) are available.

Operating force is 9 in. lbs. max. Electrical rating: continuous capacity of 30 volts dc; 20 amps. resistive; 5-amp. lamp or 12 amps. inductive; at 115 volts ac, 20-amp. resistive; 4-amp. lamp and 15 amps. inductive.

Circle No. 157 on Reader Service Card.

SOLENOID VALVES

A series of lightweight solenoid valves weighing as little as 10 ounces has been developed by Clary Corp., Automatic Controls Div. for guided missile systems.



The valves are intended for use in air, helium, nitrogen, liquid oxygen or other corrosive-liquid systems. They feature a dual operating arrangement in which valve may be operated from either an "open" or "closed" position by

a simple mechanical rearrangement of the solenoid.

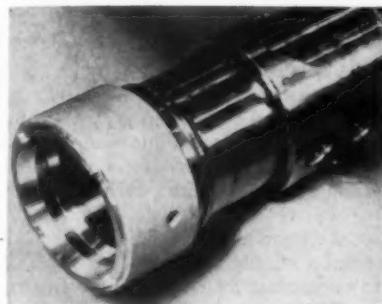
Measurements are 2" long by 1" diameter. Literature available.

Circle No. 161 on Reader Service Card.

PLASTIC-CLAD PISTONS

Plastic-clad aluminum pistons designed for heavy-duty hydraulic applications have been introduced by **The Cleveland Pneumatic Tool Co.**

The design was conceived, according to the manufacturer, to meet the need for strong, lightweight pistons that can withstand the severe servicing



requirements of shock absorbing struts in aircraft landing gear.

Thermosetting plastic is bonded to the aluminum cylinders by a cladding process developed by the Synthane Corp. of Oaks, Pa. A continuous sheet of cotton fabric impregnated with phenolic resin is wrapped around the knurled surface of a cylinder until the desired thickness of layer is obtained. The fabric is then polymerized under heat and pressure to produce a solid plastic sleeve, securely bonded to the aluminum.

Circle No. 154 on Reader Service Card.

REGULATED INVERTER

The John Oster Manufacturing Co., Avionic Division has announced a new regulated inverter which the company says features high wattage per pound of weight and cubic inches of volume. The unit weighs 3 1/4 lbs. and, with an input of 24-30 volts dc, produces 115 v, 400 cycle single, 2- or 3-phase output at 20 40 watts. Regulation and frequency regulation is rated at $\pm 5\%$.

The unit measures 6.69 x 2.87 x 3.89 inches. The Type INV-6601-02 is designed to meet MIL-E-5272A and MIL-1-7023 C specifications.

Circle No. 167 on Reader Service Card.

MAGNETOSTRICTION TRANSDUCER

A high-power magnetostriiction-type transducer, Model AM-203B, has been introduced by Acoustica Associates, Inc. for ultrasonic cleaning, de-greasing, descaling and plating. Used with a stainless steel jar, or with an externally mounted tank, rf power of

66 watts/sq. inch of radiating area can be applied.

Special fittings may be mounted on the transducer for machining and point solder applications. The unit measures $4\frac{1}{8}$ " x $4\frac{1}{8}$ ". Water cooling is used to eliminate frequency drift and loss in output. Built-in biasing magnets are provided that eliminate the necessity for bias supplies and isolation networks. The unit operates with 400 watts and produces 25.9 kc.

Circle No. 168 on Reader Service Card.

EIGHT-SCALE MANOMETER

An eight-scale instrument test manometer with a 61" scale length is offered by King Engineering Corp. Other scale lengths can be supplied.

Scales are mounted on the sides of an eight-sided vertical drum, permitting any scale to be rotated into reading position alongside the glass tube. Calibrations are in any units desired, such as pounds per square inch, altitude (ft.) or air-speed (knots). The drum may be adjusted vertically through a range of 3" to compensate for changes in barometric pressure.

The manometer is furnished with a heavy-gauge steel case and a tripod base. Wall mounting brackets are available. Literature including full details is offered.

Circle No. 169 on Reader Service Card.

AIRCRAFT CLOCK

The Wakmann Watch Co. offers an 8-day elapsed-time aircraft clock that records time of trip, with independent stopping device.

Designated Model 640 and manufactured in accordance with USAF specs (MIL-C-9196), the clock fits the standard panel opening. It has a $2\frac{3}{4}$ " dial, a 12-hour dial with center chronographic sweep second hand, upper hour register and lower 60-minute register.

Left side button sets and winds the clock, while right side button controls the sweep second and lower 60-minute register. Center lever controls upper hour register, acting independently of the sweep second.



Circle No. 169 on Reader Service Card.

RELIEF VALVES

Two new relief valves, each of which may function as a thermal relief or main relief valve, are offered by Electrol, Inc.

Model EA1160 covers a range of 2,300 to 3,850 psi, with flows of 15 cc to 1.2 gpm. Model EA1164 has a range of 1,000 to 2,000 psi, with the same rated flow capacity. Both models comply with AN6245. Each weighs $2\frac{1}{2}$ oz. is available for $7/16$ "-20 NF-3 threads or $1/4$ "-18 N.P.T.

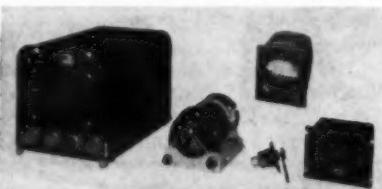
Modifications of these valves permit their use in high-temperature applications.

Circle No. 152 on Reader Service Card.

HELICOPTER INSTRUMENT SYSTEM

Lear, Inc. has developed an attitude indicating system to provide blind flying capabilities for helicopters.

The Model 4005H vertical gyro indicator is completely transistorized for increased reliability and compactness, according to the manufacturer. It has been specified as standard equipment for the Navy HUS-1 (Sikorsky S-58) and HR2S (Sikorsky S-56) helicopters.



The indicator is integrated with the autopilot amplifier. It indicates pitch and roll attitudes by motions of a universally mounted sphere painted to resemble earth, sky and horizon. The unit also contains the miniaturized transistor amplifier.

On the Navy 'copters the indicator uses as its reference the vertical gyro installed in the autopilot amplifier. The Lear central reference unit can also simultaneously supply signals for camera stabilization, antenna stabilization, navigation computers, etc.

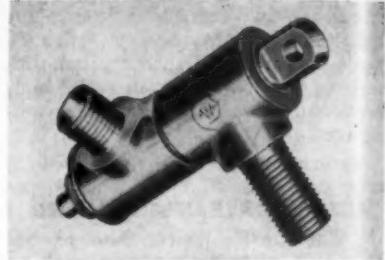
Circle No. 174 on Reader Service Card.

SWIVEL JOINTS

The Weatherhead Co. offers a pressure-balanced, low-torque swivel joint suitable for hydraulic, pneumatic, gaseous and vacuum-carrying installations in aircraft piping systems.

Trade-named the Rotomite series, the joints do not depend on piping to drive or rotate. The shaft may be actuated with a mechanical drive rod, thus eliminating tube fatigue at piping connection.

Several stock assemblies can be selected and snapped together to make up different integral unit arrangements to suit various installations. Literature is available.



Circle No. 151 on Reader Service Card.

MISSILE SEALANTS

Chemical Process Equipment Division of U. S. Stoneware Co. has developed a series of sealants and putties based on fluorocarbon resin.

Designated Fluran J-20 and Fluran J-30, these products are said to be completely resistant to highly oxidizing acids and alkalis, including white and red fuming nitric acid and up to 92% concentrations of hydrogen peroxide.

The manufacturer says Fluran, a grey-white, putty-like material, is suitable for use as a sealing compound for aluminum and stainless steel joints in construction of high-performance aircraft and guided missiles.

Circle No. 162 on Reader Service Card.

ANCHOR AND CLINCH NUTS

The Kaynar Co. has developed two new series of nuts. One is a clinch nut that combines flush-mounting and self-locking features. The other is floating anchor nut that eliminates the need for shims.

K7000 clinch nuts resist temperatures up to 550°F and meet AN-N-10 full strength requirements. The F1934 floating anchor nut is a deep counterbore, two-lug nut designed principally for use around access doors or openings that require constant grip-length screws for different thicknesses of materials. It can be used wherever a long screw is required.

Circle No. 163 on Reader Service Card.

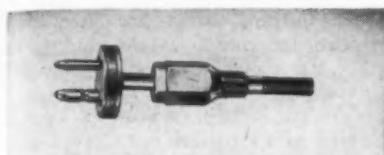
MINIATURE THERMOCOUPLES

A new line of miniature shield thermocouples for accurate temperature measurement of gases and vapor mixtures of gases and liquids in gas turbines, pumps, pipelines and similar applications has been developed by Thermo Electric Co.

The thermocouples are available with two types of shielding. T-shaped stainless steel with two open ends are used to reduce radiation losses to the cooler side-walls of gas passages. Linen bakelite open-end shields prevent condensation on the hot junction, eliminating wet-bulb effect and lowered temperature readings.

Units are calibrated in copper-constantan, iron-constantan and chro-

mel-alumel with three temperature ranges from -300° to $1,400^{\circ}\text{F}$.

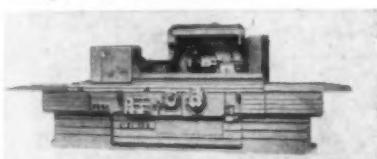


Circle No. 159 on Reader Service Card.

THREAD GRINDERS

Ex-Cell-O Corp. offers seven styles of thread grinders designed for the manufacture of parts for jet engines and airframes, scientific instruments, instrument-testing devices and guided missile weapons. Style 36 is illustrated.

Use of ground threads in the manufacture of precision parts is increasing, the company says, because of the extreme accuracy required and the hardness of metals from which these components are made. Titanium, stainless steel and new hard alloys are examples of such metals.



In one instance, a manufacturer used an Ex-Cell-O thread grinder to produce a lead screw nearly 40 ft. long with a diameter of $3\frac{1}{2}$ ".

Circle No. 153 on Reader Service Card.

Product Briefs

• Long-Lok Corp. has announced a miniature series of vibration-resistant male threaded fasteners from $\frac{1}{2}$ " diameter to the #0 80 size. Formerly available sizes were #4 to $\frac{1}{4}$ ".

Circle No. 170 on Reader Service Card.

• William H. Snow Co. offers a series of color-coded shim nuts designed to save weight and assembly costs in applications formerly required stacked shims under nuts. Typical uses are along tapered spars and door frames of aircraft.

Circle No. 171 on Reader Service Card.

• Associated Testing Laboratories, Inc. has added a variable duration shock machine to its line of environmental test chambers and equipment. It has a 150-lbs. test load capacity with shock up to 60 g's. Arrangement of blocks allows for shock duration of 6.5, 11, 18, 24 and 32 milliseconds. Literature is available.

Circle No. 172 on Reader Service Card.

• Behr-Manning Co., a division of Norton Co., offers a high-temperature crepe masking tape, identified as No. 102 Behr-cat, said to be able to resist temperatures up to 275°F for an hour.

Circle No. 173 on Reader Service Card.

Trailblazers

MARQUARDT

BREAKS

NEW

FRONTIERS

WITH

BOMARC

POWERPLANT

NEW OGDEN

FACILITIES

BOOST

NATION'S

DEFENSE



Marquardt's research center is fast becoming one of this country's creative engineering capitals. Unlimited opportunities at Van Nuys are attracting many Research and Development engineers to Marquardt.

Write for details:

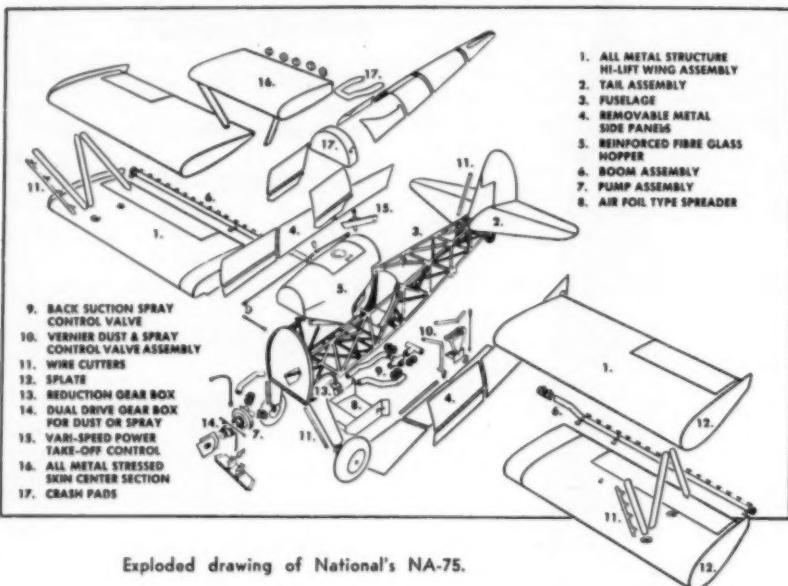
PROFESSIONAL PERSONNEL

16555 Saticoy Street, Van Nuys, California

THE WEST'S LARGEST JET ENGINE RESEARCH AND DEVELOPMENT CENTER

Circle No. 15 on Reader Service Card.

National Aircraft Gives Details On NA-75, New Duster-Sprayer Biplane



Exploded drawing of National's NA-75.

Design and production of a new agricultural aircraft for dusting and spraying has been announced by the National Aircraft Corp. of Burbank, Calif.

NAC engineers worked closely with operators and pilots in agricultural aviation while designing the workhorse.

Designated the NA-75, the duster-sprayer biplane features:

- Improved Stearman fuselage which has been covered with ten metal panels, fastened with Airloc fasteners. The fuselage, the company says, can be stripped from firewall to tailwall in minutes for easy inspection or maintenance.

- National Hi-Lift wings provide an empty stall speed of 35 mph. Wings are fabric covered over all-metal structure with the center section of all-

metal skin stressed construction. Combined wing area is 338.26 sq. ft.

- A combination 31.7 cu. ft. reinforced fibre glass dust-spray hopper permits rapid change from one operation to the other. A liquid-tight dust gate, which acts as an emergency dump valve, can dispose of a load in five seconds. Pump, agitator drive, shut-off valve and all spray boom plumbing has been put in the fuselage to eliminate drag.

Dusting venturi is a low-drag airfoil type and the spray boom is mounted on the trailing edge of the lower wing.

The NA-75 can either be purchased as a complete aircraft or any of the above three features are available in kit form for modification of existing Stearmans.

The plane can be powered by the Continental 220, Lycoming 225 or 300, Jacobs 245 to 300, Pratt & Whitney 450, or the Wright 425.

Instrumentation has been moved from the cockpit to the trailing edge of the center wing section for better visibility.

The cockpit, in turn, has been covered with a six-inch crash pad. Chromemoly wire cutters are installed on landing gear, wing struts and vertical fin. Also for reasons of improved visibility, the plane has been designed to fly in a nose-low attitude at all times.

Cessna Boosts Specs For 620 After Tests

Cessna Aircraft Co. has completed Phase I tests (performance evaluation) on its four-engine Model 620 executive transport after 25 hours' flight time.

As a result, the company boosted performance figures. Maximum speed at 15,000 ft. has been raised from 269 mph to 282 mph, while maximum cruise goes up from 235 to 260 mph at 12,500 ft. and 2,600 rpm.

The four Continental GSO 526-A six-cylinder engines have been rerated from 320 hp to 350 at sea level. Maximum continuous rating is 310 hp. Takeoff gross has been increased from 13,650 to 15,000 lbs. Estimated empty weight is 10,000 lbs.

Price tag for the 620 has been set at approximately \$375,000. Electronics (including Collins integrated flight system) and wing de-icing are optional to make it an all-weather aircraft. Other optional equipment includes passenger oxygen, custom furniture and paint designs, reversible props, nonskid brakes and power steering.

Standard equipment includes five sleeper-type seats and a folding table. Crew oxygen also is standard.

Production is scheduled to begin early in 1958.

Three New Aircraft To Be Produced

Production plans for three new aircraft types recently were announced. They are:

- Custer Channel Wing, under development by Willard Custer since the war and extensively flight tested at Oxnard, Calif. for the past two years, will be produced commercially by a new company.

- Established specifically to build the CCW-5 and CCW-2 commercially under license, the new company is headed by Louis Leone, Texas real estate and building contractor, in

NA-75 Performance Chart

Load	Gross	Take-Off Distance (Ft.)			Climb (F.P.M.)			180° Turn/Sec.			
		275 HP	220 HP	450 HP	275 HP	220 HP	450 HP	Stall	275 HP	220 HP	450 HP
2612	350	450	186	925	700	1220	35	16	18	16	
500	3112	520	645	330	900	660	1110	41	16	20	16
750	3362	650	785	375	860	580	1040	45	17	22	17
1000	3612	730	845	420	740	500	900	50	17	24	18
1250	3862	740	890	500	500	420	820	55	20	25	18
1500	4112						740				19
1750	4362						600				20
2000	4612						550				21

Remarks: All information corrected for sea level—29.92 Hg & 59.6°F.

the
300,
450,
oved
edge
etter
cov-
ome-
and.
fin.
lity,
in a
eted
(ion)
tive
-
ested
speed
269
num
mph
-26-A
ated
axi-
ake-
,650
ight

set
ronics
sys-
al to
ther
anger
paint
akes

five
ding
d.
begin

air-
ced.

de-
the
at
years,
y a

the
un-
is
real
in
TION

McAllen, Tex. The company, Custer Channel Wing Manufacturing Corp., is financed by a group of Texas and California oil and cattle interests.

Leone said the major project of the new firm is to put the Channel Wing aircraft into immediate production, although additional flight testing will be carried out.

* The Silvaire Uranium and Aircraft Co. of Fort Collins, Colo. has put its two-place Silvaire lightplane into production, with the first model successfully flight-tested last month. Four other aircraft are in various stages of construction. Otis Massey, head of the new firm, purchased the parts, tools, engineering and CAA data from the Luscomb Airplane Co. of Dallas in early 1955, and resumed production in Fort Collins in June.

* Delivery of the first Skimmer three-place Amphibian was made to Huck Aircraft Corp. of Greenwich, Conn. Simultaneously, Colonial Aircraft Corp. of Sanford, Me. announced that present two-per-month production schedule would be doubled in the near future. Priced at \$15,750, the Skimmer cruises at 123 mph and is of all-metal construction.

Aero Design Evaluates Reversible Props



Engineering evaluations of reversible propellers on the Aero Commander are being conducted by Aero Design & Engineering Co., it has been announced. The new Hartzell full-feathering reversible propeller, designated model HC83F-3A, is being used.

The reverse prop is felt to increase the utility of the twin-engine business plane by increasing operating safety into short fields and providing assistance in braking on icy or wet runways. It can also be used to back up the airplane and facilitate ground handling.

Aero engineers have estimated that a 90-mph velocity of the Commander at 6,000 lbs. gross weight can be decelerated in about 400 feet.

The reversing process is controlled electrically by actuating both reverse switches. The mechanism is so designed that reverse pitch can only be accomplished when the throttles are completely closed, thus preventing any danger of reversing in flight even if the actuators are energized. The blades move into a reverse position angle of minus 25 degrees.

SAC Building \$4-Million Business Flying Center

A \$4-million business flying center will be the result of a "Five-Year Plan" recently announced by Southwest Airmotive Co., representing the largest single investment yet made for such facilities.

Construction on the first \$2 million project is under way on a new 35-acre tract at Dallas' Love Field, and includes (within dotted line) five-section hangar and two-story terminal building and a 400-by-80-ft. Plane O Tel hangar, due for occupancy next

summer. Ramp work will be completed December 1.

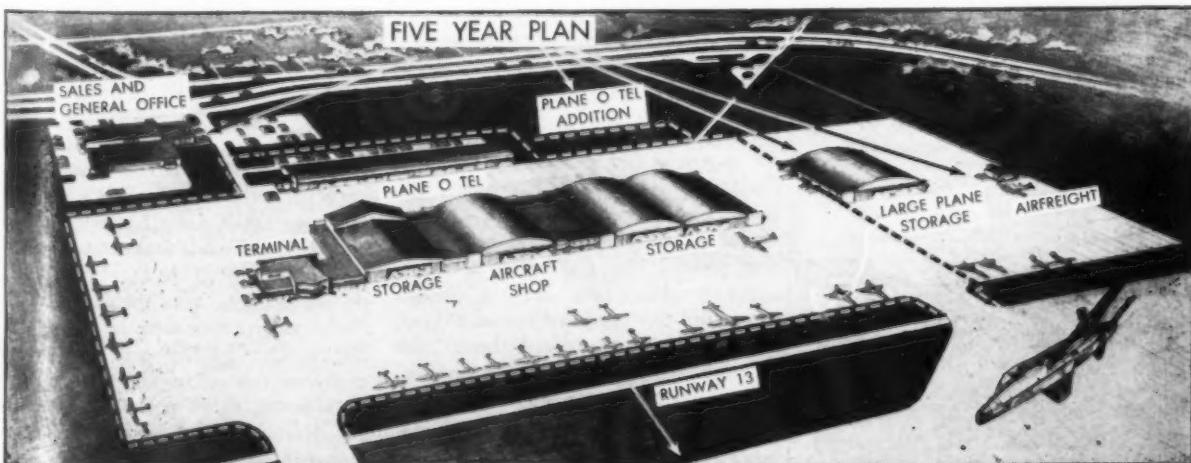
The second phase—to be completed within five years—calls for construction of a distributor-sales and general office building (upper left), large-plane storage hangar, an airfreight building (far right) and extension of the Plane O Tel.

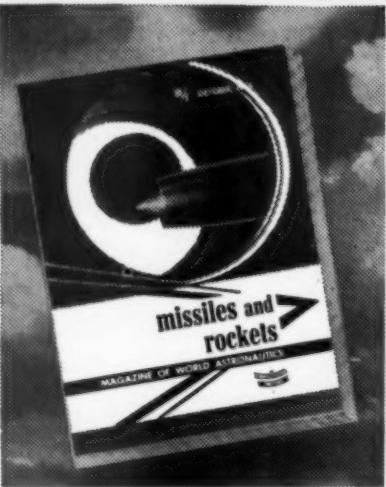
When completed, SAC will have hangar accommodations for 200 business aircraft and tie-down facilities on its 11-acre concrete ramp for another

200 planes.

A gasoline and oil tank farm with 219,000-gallon capacity already has been completed and is in operation.

SAC's lease with the city of Dallas is for 25 years with a 10-year option. The city is assisting SAC finance its project through \$1.5-million in revenue bonds which SAC will pay back in 15 years. SAC will also pay a \$450-per-acre annual rental on the land. The balance of the \$4 million will be financed privately.





missiles and rockets

MAGAZINE OF WORLD ASTRONAUTICS

. . has just come off press.
Already this Volume 1,
Number 1 issue is almost
out of print.

If you are in the rapidly expanding missile and rocket industry, or engaged in satellite science, and want to make sure that you won't miss out on this valuable issue, and all the future issues of the Magazine of World Astronautics, then fill out and mail the coupon below today. Note that the special Charter Subscription Rates will only be in effect until October 15, 1956.

missiles and rockets

Magazine of World Astronautics

A New American Aviation Publication
1001 Vermont Ave., N.W.,
Washington 5, D.C.

Send 1 year @ \$4 2 years \$6.
(Rates for U.S.A., Canada. Overseas: 1 year
\$5, 2 years \$8.)

Bill me. Bill company. Check enc.

Name _____

Job Title/Position _____

Company _____

Products/Service _____

Mail Address _____

City, Zone, State/Country _____

P&W Plans Full Parts Support For R-985, SAC Forum Hears

DALLAS—Plans for fully supporting the R-985 Junior Wasp engine in spare parts were disclosed at the Pratt & Whitney Engine Forum at Southwest Airmotive Co. Canadian Pratt & Whitney Co., Ltd. already is manufacturing new 985 master rods and cylinders and complete parts for the R-1340, many of which are interchangeable with the 985.

But as the surplus market dries up on other 985 parts, new production will start, it was promised, until the engine is once again fully supported.

Out of production for several years, the Junior Wasp is the standard engine in the Beech D-18S series and still is widely used in other older aircraft for executive and agricultural services. Though the R-985 is expected to be operated for some time to come, P&W has no plans for putting it back into production unless there is a much larger demand. Beech uses the military as its source of supply on the engines for the Super Beechcraft, most of which are rebuilds.

The forum produced some constructive tips on operating and maintaining the old powerplant. P&W experts said:

• There is no reason why the engine can't be rated at 450 hp. Pointing to "a certain amount of confusion" between the commercial and military versions, it was explained that it boiled down to a different set of ground rules, though the mechanics are the same. P&W originally rated the engine at 400 hp, but it was later CAA certificated at 450 hp. Maximum cruise of 300 hp. at the top end of the recommended cruise power is within the limits. It was suggested, however, that a more conservative rating might result in greater overhaul life and lower parts replacement.

• An average of 1,000 hours between overhaul was suggested as a yardstick. The experts noted, however, that they couldn't give a flat figure, since it depends on the type of use to which the engine is put. About 900 hours is considered good, with 1,200 to 1,400 hours having been achieved in some executive operations. Crop-dusters, it was pointed out, must have a much lower overhaul time because of the "wear and tear" imposed on the engine. Operators, it was suggested, should start at a low 800 hours and run it progressively higher as experience is gained.

• The panel cautioned that the engine's temperature should be kept

well above freezing—35°C or 40°F. Adjusted carburetor heat should be kept going at all times, except at takeoff. The 985 "can ice fast," operators were warned.

P&W "thoroughly endorsed" the use of oil filters on the grounds "the cleaner the oil, the better the engine will run." Acknowledging a weight penalty, the panel added it was up to the operators to accept it or reject it.

P&W's major experience with the filters has been with crop dusters at low altitudes, where the contamination is well above average. It was found that the oil filters result in a "great reduction" of parts replacement when the engine is in good shape. It was felt that, while conditions are not as severe in business plane operations, the same general results would apply. One slight reservation was expressed in the use of the oil filters in cold-weather operations. The company wants more experience before providing an "absolute endorsement."

• Chrome plating of cylinder heads apparently leaves P&W cold. In response to a specific question, a P&W spokesman answered: "We don't condemn it, but neither do we endorse it." Main reasons for the passive objection set forth were: (1) Barrels must be honed out straight in preparation for chrome plating, which makes it subject to "a lot of fire erosion." (2) The chrome ring is a fine seal and if not used, you are "asking for trouble with the pistons."

The crankshaft rework on the 985 ordered in April 1955 was fully discussed. Though no indication was then given of any further directives, it was learned that another bulletin will be issued shortly. CAA knows of about six failures since the rework was accomplished. P&W currently is preparing another bulletin which probably will be followed by a CAA Airworthiness Directive.

It will call for complete removal and inspection of the shaft with a shadowgraph to make sure that the incorporated 9,000th radius is down to the bottom of the thread. If not, rework will be mandatory, after which another shadowgraph inspection is to be conducted. Grit blasting will have to be conducted on all shafts whether rework is dictated or not. Purpose of the grit blasting is to smooth down the thread in addition to the radius.

People

AIRLINE

Ray Silvius, former aviation editor of the *Arizona Republic*, appointed news bureau mgr., Western Air Lines.

O. L. Slay made Midwestern regional mgr. and **Robert M. Maloney** named Eastern regional mgr. for Slick Airways, Inc.

Chester E. Lundstrom promoted to asst. treas. of Central Airlines, Inc.

William J. Doheny appointed cargo sales representative for British Overseas Airways Corp.

Chet R. Lubben appointed director of sales administration for Frontier Airlines.

Richard Haughton named research analist of Continental Air Lines.

Leroy Simpson appointed supt. of operations engineering of Pan American World Airways' Pacific-Alaska division; **Edwin B. Weissinger** returns to industrial relations staff of Latin American division.

Capt. Bryan W. (Fuzzy) Robinson and **Capt. Ray D. Wonsey**, American Airlines, reach compulsory retirement age.

MANUFACTURING

James P. Lydon moves from director of industrial relations to director of administration at Lockheed Aircraft's Georgia Division. Other changes: **H. Fletcher Brown**, asst. gen. mgr. of the division, succeeding **A. Carl Kotchian**, who becomes division gen. mgr. and vp of Lockheed; **Ralph J. Osborn**, mfg. mgr.; **R. A. Mackenzie**, asst. mfg. mgr.; **H. Lee Poore**, production mgr.; **William B. Rieke**, asst. production mgr.; **Nicholas Ricciardi**, director of materiel.

John McCulloch named supt. of TT-1 Navy jet primary trainer production at Temco Aircraft Corp.'s Dallas plant.

David B. Kreider appointed structural insulation engineer for Royal Jet, Inc.'s aircraft division.

Cmdr. James H. Manning (USN, ret.) joins Piasecki Aircraft Corp. in an executive position.

George M. Hartley appointed mgr. of marketing for General Electric's metallurgical products dept.

Thomas O. Moore named chief electronics engineer for ORRadio Industries, Inc.

Leonard Goland appointed director of research for Kellett Aircraft Corp.; **Al Yackle** named chief of special projects; **Blair Baisley** succeeds Yackle as chief of structures; **David Gebhard** appointed chief of preliminary design.

Dr. Donald J. Gimpel heads Panelit, Inc.'s electronic projects and will aid in systems research program.

Charles H. Kanavel appointed field sales mgr. for B. F. Goodrich Aviation Products, division of The B. F. Goodrich Co.; **G. G. Zimmerman** named mgr. of tires, airlines and distributors.

M. P. Blum joins General Precision Laboratories, Inc., as project engineer.

OCTOBER 8, 1956

RAdm. R. Morgan Watt, (USN, ret.) appointed asst. to the president, Kaiser Aircraft & Electronics Corp.

Paul S. Kempf named industrial relations director for Hoffman Electronics Corp.

Victor J. Kayne joins Aircraft Owners and Pilots Association as consultant.

C. Wickham Skinner named director of administration for the inertial guidance plant to be built by the aeronautical division of Minneapolis-Honeywell Regulator Co. at St. Petersburg, Fla.

Dallas V. Franke heads new engineering department at the LearCal Division of Lear, Inc.

Karl D. Swartzel appointed chief research and development engineer of Republic Aviation Corp.'s guided missiles division.

Kenneth L. Moan named administrative engineer of Chandler-E v a n s, division of Pratt & Whitney Co., Inc.

Walter T. Hynes named mgr. of the electronic components division of Waters Manufacturing, Inc.

Louis J. Springer appointed asst. to the exec. vp of Airwork Corp.

Douglas Hembrough made eastern regional mgr. of Pacific Scientific Co.

Dave Gerstein promoted to vp-sales, government and industrial products, for Olympic Radio & Television.

Nicholas M. Esposito named production mgr. of the H. W. Loud Machine Works, Inc.

John R. Church named aviation sales coordinator for AC Spark Plug Division of General Motors.

R. C. Poucher becomes chief sales engineer, the Nutt-Shel Co.; **R. H. Blakeley**, assistant to the president, and **R. W. Dietlein**, chief engineer.

Harold L. Russell named eastern regional mgr. and **William C. Abbey** named southwest regional mgr. of Fischer & Porter Co.; **Norbert Weber** appointed European mgr.

Clyde L. Councilman appointed chief engineer of Air Associates, Inc.

John F. Taggart appointed mgr. of Fairchild Aircraft Division's St. Augustine branch plant.

GOVERNMENT

Col. Willis L. Helmantoler, chief of the public information division, USAF Office of Information Services, assigned to the Fifth Air Force in Tokyo as chief of information services.

Maj. Gen. John S. Mills, USAF, appointed asst. deputy chief of staff for development, replacing **Maj. Gen. H. G. Thatcher**, assigned vice commander of the USAF in Europe at Wiesbaden, Germany.

Robert H. Ames named publisher of the *Army-Navy-Air Force Journal*, Washington, D. C.; **LeRoy Whitman** continues as editor.

HONORS

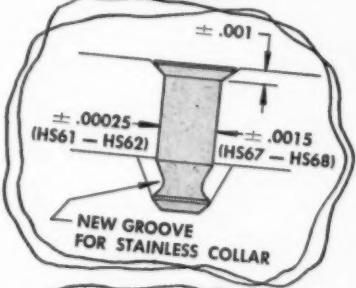
Julius Haber of Radio Corp. of America reappointed chairman of the public relations and advertising committee of the Radio-Electronics-Television Manufacturers Assn.



31% STRONGER IN SHEAR
THAN NAS BOLTS —
TENSILE EQUAL TO AN BOLTS

900° F. HEAT RESISTANT
FOR AREAS OF ENGINE
HEAT AND SKIN FRICTION

TOPS FOR FASTENING
17-7PH AND TITANIUM
MATERIALS



AVAILABLE IN
1/8 THRU 3/8 DIAMETERS —
OVERSIZE 1/32 AND
1/64 FOR SALVAGE



U.S. and foreign patents — Trademark registered.



Circle No. 22 on Reader Service Card.

West Coast Talk . . . By Fred S. Hunter

- Gross sums up Lockheed policies in memo.
- WAL finds out all about DC-6B, dollarwise.

THERE WAS, to our way of thinking, one paragraph—an unpublicized paragraph, incidentally—that stood out above all others in the management memo Chairman Robert E. Gross distributed to Lockheed executives outlining the reasons for the top-level management shuffle that became effective at Lockheed on October 1. In four simple sentences it spelled out the progressive business philosophies of the company. This is the paragraph:

"While we are firmly convinced that the demand for missiles and commercial airplanes will continue to grow, we cannot ignore the fact that there is considerable uncertainty concerning the future volume of strictly military airplane business. Hence we may wish to expand our activities into allied fields. Diversification of our operations in the future may be the key to continued employment of our people and safeguarding the investment of our stockholders. By more utilizing our senior management talent and by bringing along younger men, we may become more flexible and will be in a better position to extend the scope of our operations should it appear advantageous to do so."

* * *

Western Air Lines currently is engaged in its first major overhaul of a DC-6B at its Los Angeles shops. When the airplane was brought in, after 11,300 hours of flight time, Stan Shatto, WAL's vice president-operations, thought it would be a good time to find out just what operation of one modern-type aircraft entails dollarwise. Here's what he came up with:

Total direct operating costs for the 11,300 hours amounted to \$2,163,102, divided by \$1,674,660 in direct flying costs and \$488,442 in direct maintenance costs, not counting the present overhaul, estimated at approximately \$75,000. Depreciation came to \$572,000. Adding 100%, the accepted ratio for indirect costs, Shatto came up with a grand total of \$5,470,556. The DC-6B cost WAL \$1,200,000 in the first place. So, as Shatto put it, WAL bought

the airplane back four times in the cost of operation.

* * *

Douglas plans to use the first nine DC-8s off the line in expediting the jet transport's complex flight test program which will involve three basic power plant variations and two weight configurations. Here's the lineup on the nine planes: No. 1 airplane will be J57-powered domestic model; No. 2 will be J75-powered domestic; Nos. 3 and 4 will be J57 domestics; Nos. 5, 6 and 7 will be J75-powered overwater versions; Nos. 8 and 9 will be Rolls-Royce Conway-powered models. Present schedule calls for first flight of first airplane in March, 1958. Production rate at that time is expected to be one airplane a month. This rate is to be accelerated to six planes a month by the end of 1959. CAA type certification and delivery of the first airplane is scheduled for September, 1959.

* * *

There's some feeling among defense firms in the small business category that skilled and experienced firms are getting the short end of the stick in the small business picture. Small Business Administration, they say, has an inclination to put its emphasis on helping firms which have no experience.

* * *

Aircraft companies hold open house events primarily to strengthen their community relations and stimulate employee morale. It's also a good way to get a factory cleaned up.

* * *

Pan American pilots are finding 50-foot wide taxiways a little narrow for their new DC-7Cs. Tread of main gear is 34 feet. Add tire widths and you don't have much margin left to keep from running off the side of the apron. Gear on Lockheed's Model 1649A is even wider.

Ratio of glass to solid wall in Northrop Aircraft's new engineering building is 1 to 2½. The architects, Pereira & Luckman, are of the window school of industrial designers.



Hunter

To the ENGINEER of high ability

Through the

efforts of engineers

The Garrett Corporation
has become a leader in many
outstanding aircraft component
and system fields.

Among them are:

air-conditioning
pressurization
heat transfer
pneumatic valves and
controls
electronic computers
and controls
turbomachinery

The Garrett Corporation is also
applying this engineering skill to the
vitally important missile system
fields, and has made important
advances in prime engine
development and in design of
turbochargers and other
industrial products.

Our engineers work on the very
frontiers of present day scientific
knowledge. We need your creative
talents and offer you the opportunity
to progress by making full use of
your scientific ability. Positions
are now open for aerodynamicists

... mechanical engineers

... mathematicians ... specialists in
engineering mechanics ... electrical
engineers ... electronics engineers.
For further information regarding
opportunities in the Los Angeles,

Phoenix and New York areas,
write today, including a résumé
of your education and experience.

Address Mr. G. D. Bradley

THE GARRETT CORPORATION
9851 So. Sepulveda Blvd.
Los Angeles 45, Calif.

DIVISIONS

AiResearch Manufacturing,
Los Angeles

AiResearch Manufacturing,
Phoenix

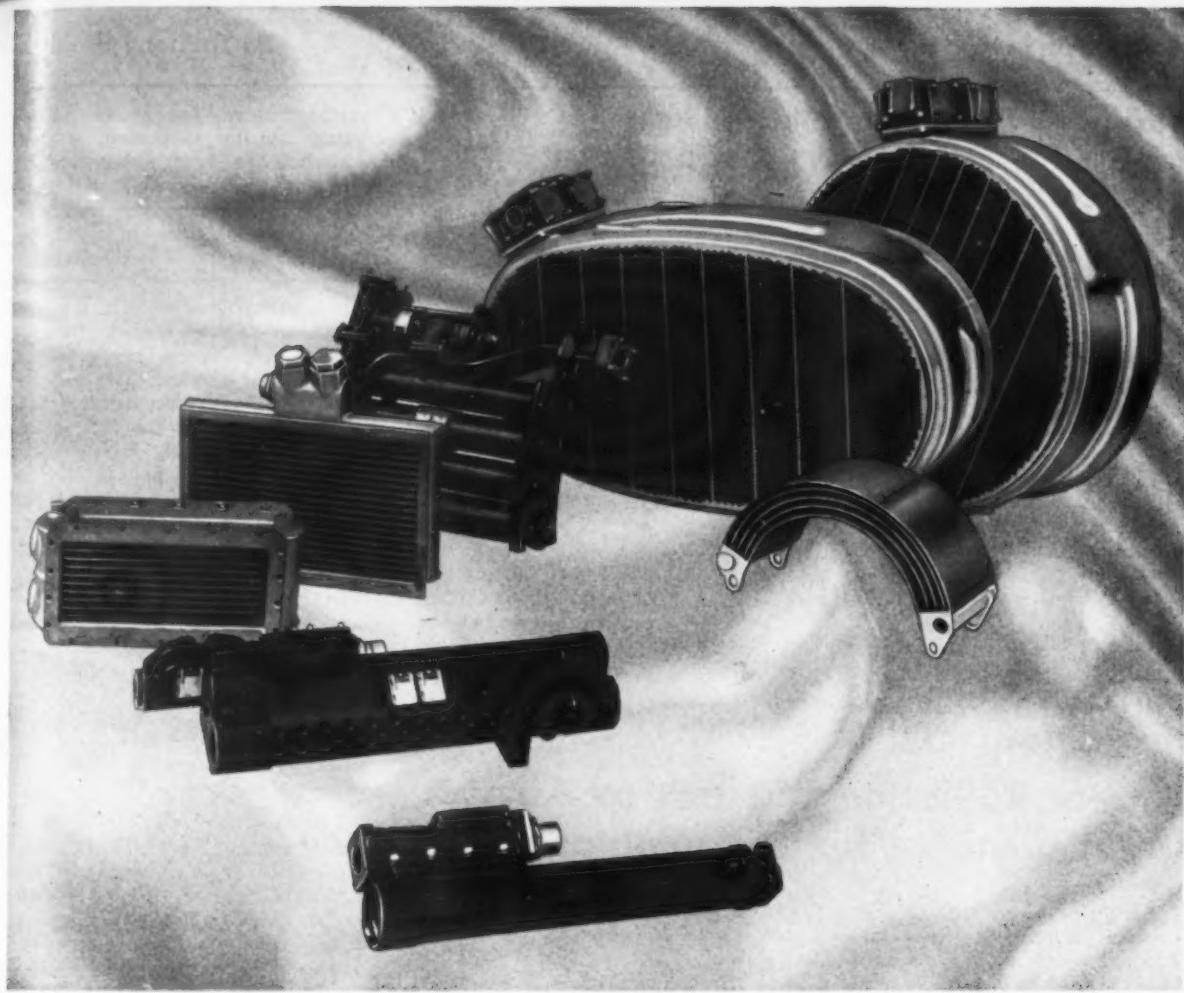
AiResearch Industrial

Rex — Aero Engineering

Air Supply — Air Cruisers

AiResearch Aviation

Service



FOR EVERY AIRCRAFT APPLICATION

AiResearch oil temperature regulators

Exclusive design featuring mechanically-bonded, replaceable tubes allows for easy repair in the field

AiResearch is the largest manufacturer of aircraft oil temperature regulators in America. High efficiency, easy repair, long life and normal operation under extreme

sub-zero temperatures has established industry-wide preference for AiResearch units. They are manufactured to rigid specifications, and their appearance and reliability reflect the most careful craftsmanship.

AiResearch has been building oil temperature regulators of the highest quality since 1940. Many have had more than 20,000 hours of

operating service and are still performing with complete efficiency.

Let us discuss your oil cooling problems with you. After analysis, our engineers will suggest a solution which will stand up on the basis of both present need and future dependability.

Qualified engineers are needed now. Write for information.

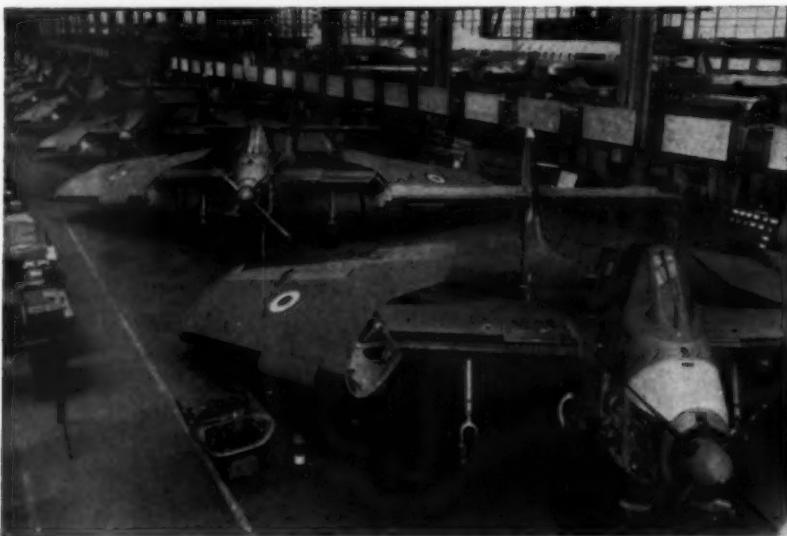
THE GARRETT CORPORATION
AiResearch Manufacturing Divisions

Los Angeles 45, California . . . Phoenix, Arizona

Designers and manufacturers of aircraft systems and components: REFRIGERATION SYSTEMS • PNEUMATIC VALVES AND CONTROLS • TEMPERATURE CONTROLS

CABIN AIR COMPRESSORS • TURBINE MOTORS • GAS TURBINE ENGINES • CABIN PRESSURE CONTROLS • HEAT TRANSFER EQUIPMENT • ELECTRO-MECHANICAL EQUIPMENT • ELECTRONIC COMPUTERS AND CONTROLS

British Anti-Sub Aircraft in Production



Seafire anti-submarine aircraft is in full production at Short Bros. & Harland's Belfast plant, as is (in rear) Bristol Britannia.

Nuclear Radiation Hazards to Aircraft Great, British Wing Commander Says

Some of the Royal Air Force's philosophy on nuclear radiation hazards was given recently by Wing Commander G. H. Dhenin in a paper read to Britain's Society of Licensed Aircraft Engineers. He pointed out that an aircraft flying through a nuclear cloud is severely contaminated by radiation, particularly the air-swallowing parts of the engines, air-cooled components (such as generators and invertors) and cavities such as control-surface hinges.

The airplane's crew are first intensively exposed and then continuously subjected to radiation at a decaying intensity, Dhenin said. Crew protection is limited by weight to what can be achieved through clothing and by measurement with individual dosimeters.

* Returned airplanes represent a severe radiation hazard and decontamination problem. Scrubbing down is still the best method, but is costly in manhours and inconvenient in field operations. The solution, Dhenin suggested, may be to disperse contaminated airplanes downwind and depend on decay rate of radiation to decontaminate them.

Servicing would be done quickly by personnel in protective clothing, who would receive smaller doses of radiation than they would during cleansing

of the airplane. The probable rapid pace of a nuclear war intensifies the problems.

The airplane hard standings would require hosing and drainage to special radioactive liquid tanks. For complete decontamination of engines they require stripping "to the last compressor blade" and vapor blasting has proved the only reliable cleansing method—suggesting that decontamination is possible only at overhaul.

* Technical difficulties of the nuclear power plant are immense, Dhenin noted, but the greatest problem is shielding the crew from gamma radiation and neutrons. The great weight of shielding and the consequent high landing weight mean larger and heavier gear than today. Radiation hazards during fuel or powerplant change would be intense and far easier. More rapid access would be required than exists today, but even so "it would be a highly complicated feat of remote-handling engineering and health physics." The crash hazard in populated areas would be very great and large sectors of a city might have to be evacuated.

Dhenin thought the last factor precluded civil use, but suggested that, since it is certain that (military) nuclear airplanes will be "mighty big,

a more advanced, but by no means altogether fanciful suggestion, is that the airplane be kept airborne until the reactor needs servicing and that all other materials and personnel will be transferred to them in flight by tenders of more conventional aircraft."

It is encouraging to learn that the International Air Transport Association's Facilitation Committee considers that facilitation has been able to keep pace with technical development. The committee reports that the 35% reduction in elapsed time on the New York-London run—from 23 hrs. 20 min. in 1948 to 14 hrs. 10 min. today—has been matched by a cut in passenger ground time at the terminals from 3 hrs. 15 min. to 2 hrs.

IATA and ICAO have done a good job in cutting red tape but, to quote IATA president Lord Douglas of Kirtleside, "the traveling public is becoming increasingly irritated by the paradox that while the flying part of the trip becomes faster and more comfortable, the ground part becomes more troublesome and lengthy."

Few will disagree with Lord Douglas, who is chairman of British European Airways, that one of the most distressing facts about air travel in Europe is that on journeys less than 600 miles the ground part takes longer than the time spent in the air.

On London-Paris journeys, for instance, the passenger now spends 150 minutes on the ground compared with only 65 minutes in the air. There is almost more time to serve a meal in the coach to London airport than in the aircraft. Incidentally, in 1939 London-Paris ground time was half what it is today although flying time was only 25 minutes longer.

The advent of the jet will make ground time a vital factor for long as well as short journeys. In 1959 the elapsed time from London to New York should be about six hours, a 57% improvement on the 1956 performance. IATA's Facilitation Committee points out, however, that if ground formalities remain at present levels, the total time for the passengers will be eight hours. Ground time will represent 25% of the total time.

The committee considers it essential to cut inbound and outbound ground formalities to a total of one hour. If this were achieved ground time would represent 14% of the total time for the transatlantic flight.

*"To be prepared for war is one of the most
effectual means of preserving peace"*

George Washington

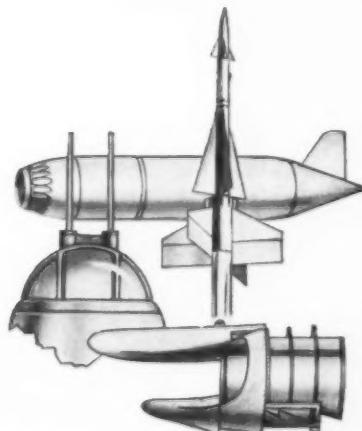


GOVERNMENT PRODUCTS DIVISION

From the experience of men and nations has sprung the concept of *peace through power*. Even when our nation was young, strength had long been recognized as an effective deterrent to war.

Today, the Government Products Division at Rheem is proud to take part in the furthering of this concept. Rheem develops and produces, for government and industry, quality products that are contributing to the strength of our nation. Low per-unit cost, and delivery that meets the most stringent completion schedules, are part of this contribution.

Rheem's integrated Government Products facilities are presently in quality development and production on air frames, missile and jet engine components, airborne ordnance, electronics and ordnance materiel.



YOU CAN RELY ON RHEEM

Rheem Manufacturing Company • GOVERNMENT PRODUCTS DIVISION

DOWNEY, CALIF. • SAN PABLO, CALIF. • WASHINGTON, D.C. • PHILADELPHIA, PA. • BURLINGTON, N.J.



FOR THE GIANT JETS... **scores of precision components**

Through many years Kelsey-Hayes has worked closely with major aircraft engine builders. Today, with the addition of new plants, expanded research and engineering staffs, and augmented production facilities, assignments from the aviation industry are increasing rapidly.

Products include accessory gear assemblies, actuators, transmissions, power recovery units, radar tracking and scanning equipment, computers and controls. And for jets: compressor rotors, turbine sections, blades, buckets, vanes.

Kelsey-Hayes has the experience and facilities for research, design, prototype development and production.

KELSEY-HAYES

Kelsey-Hayes Wheel Co., Detroit 32, Mich. • Major Supplier to the Automotive, Aviation and Agricultural Industries

**14 PLANTS / Detroit and Jackson, Michigan; McKeesport, Pa.; Los Angeles, Calif.; Windsor, Ontario, Canada • Davenport, Iowa
(French & Hecht Farm Implement and Wheel Division) • Springfield, Ohio (SPECO Aviation, Electronics and Machine Tool Division)
Utica, New York—4 plants—(Utica Drop Forge and Tool Corporation, a subsidiary)**

TRANSPORT TRENDS

Washington, D. C., Oct. 8, 1956

DOMESTIC AIRLINES' EXPENSES have been rising faster than revenues. Trend has been under way since last year's fourth quarter. Some carriers are exceptions, of course. But for the trunk group as a whole, revenues rose 12.2% in the first half, while expenses gained 13.6%. Net profit after taxes for six months was up less than 1% over same 1955 period. Trunks' net last year was \$63.1 million. Some observers don't think it can top \$66 million this year. Increased volume of business is principal thing offsetting expense gain. Comment most frequently heard: "We have to run like hell to keep even."

●

AIR TRAFFIC IS PULLING CLOSER to rail total. Analysis of results for first half of 1956 shows 11.2 billion rail passenger-miles against 10.9 billion air. Thus, air (trunk and local service) was 97.2% of rail (commutation excluded). During the period, airline traffic gained 13.5%, rail slipped .7%.

●

TREND OF USED AIRPLANE PRICES: One dealer is quoting DC-4s at \$630,000 to \$750,000, Convair 240s at \$500,000 to \$605,000, DC-3s and cargo C-47s from \$110,000 to \$198,500. Executive DC-3s are priced from \$142,000 to \$265,000.

●

BOSTON-NEW YORK-WASHINGTON market has emerged as one of the most competitive in the world, despite emphasis in recent CAB route cases on other areas of the country. Nine airlines now have New York-Washington certificates. Eight of them are also in Boston-New York market. American, Eastern, National and Northeast have unrestricted rights in the area. United, TWA, Braniff, Delta and Capital are limited to long-haul rights, i.e., service must originate or terminate at a point south or west of Washington.

●

FBI INVESTIGATION of the apparent "leak" of CAB's decision in the New York-Florida case is in full swing. Odds are that a final report on the investigation won't be ready for several weeks. CAB personnel and industry officials in and outside Washington are being queried. Meanwhile, Senate Investigating Subcommittee is conducting a preliminary staff check, but hasn't decided yet on either a formal investigation or public hearing.

●

NEW ROUTE CASES at CAB are now so numerous that airline lawyers are being forced to cut corners. They're limiting cross-examination in order to keep pace with the volume of work. Result is that some hearings are being completed in much less time than was originally anticipated. But the lawyers say that this practice doesn't permit proper development of a record in a case.

●

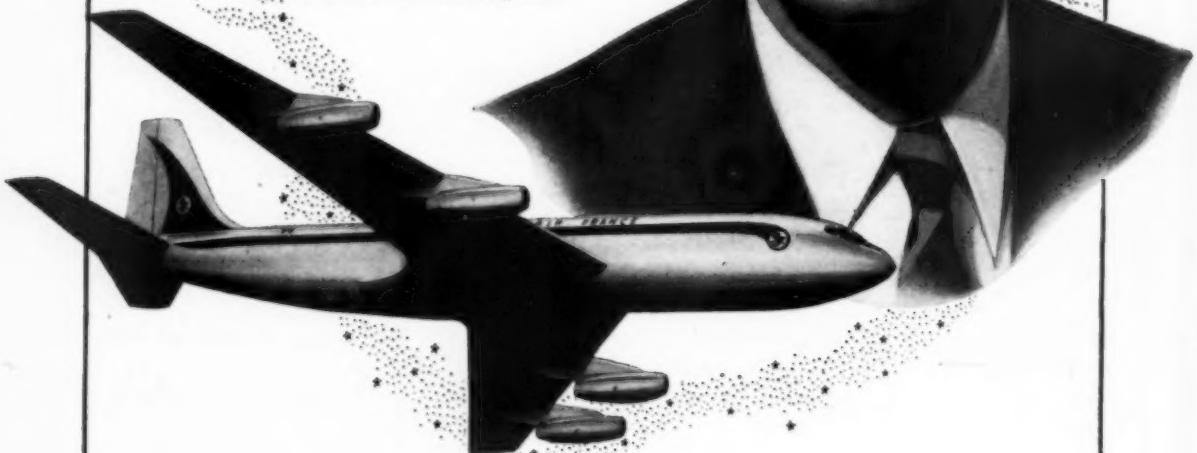
A U.S. TEAM of CAB and State Department officials goes to Europe this week to try to sell individual nations on the idea of a high-level governmental policy group to oversee International Air Transport Association fare practices. CAB has approved current IATA fare schedules but contemplates reconsideration prior to next April, subject to results of discussions with European countries.

The Men Who Are Air France

No. 2 OF A SERIES

CAPTAIN LIONEL CASSE

A Senior Air France Captain



He Knows His Jets!

...and knows them well! Captain Casse is one of the few men in the world who has flown all major jet transports. He has operated Comet 1's and Viscounts on operational runs, test flown the Boeing 707 and the Caravelle. As Chief Pilot Advisor to the Director of Engineering and Maintenance for Air France, his experience will be put to good use in ushering in the age of jet transports.

Captain Casse is typical of the men who have made it possible for Air France to serve the people of 73 countries for 37 years...typical of those who will add to Air France's record of service, comfort and dependability in the years ahead.



AIR FRANCE

THE WORLD'S LARGEST AIRLINE

WITH 177,740 UNDUPPLICATED ROUTE MILES TO 236 CITIES IN 73 COUNTRIES

SEE YOUR TRAVEL AGENT, OR AIR FRANCE • New York • Atlanta • Boston
Chicago • Cleveland • Dallas • Detroit • Los Angeles • Miami • Philadelphia • Pittsburgh
San Francisco • Washington, D. C. • Mexico City • Montreal • Toronto • Vancouver • Havana
Puerto Rico • Fort de France • Pointe à Pitre • Panama • Caracas • Bogota

TRANSPORT AVIATION

Airlines Optimistic on New Ticketing Plan

Minimum time-limit system, now in fourth week,
gives promise of reducing no-shows

By ERIC BRAMLEY

New methods of getting tickets into the hands of customers well in advance of flight time have resulted from the domestic airlines' minimum time limit (MTL) plan.

The plan, now entering its fourth week, is reported to be working smoothly, and there is general optimism that it will reduce the number of no-shows.

An AMERICAN AVIATION survey shows:

- Tickets-by-mail and ticket payment through use of bank depositories are methods receiving considerable attention, in addition to usual ways of ticketing. They're methods that might not have been pushed, had it not been necessary for the industry to make it as easy as possible for passengers to meet the time limits.

- Time limits are not uniform (see table).

Airlines disagree over whether the MTL will increase their expenses.

Each Line Sets Own Time

Briefly, MTL provides that each line can set its own time by which a ticket must be bought to cover a reservation, but all carriers must meet the following minimum set by the Air Traffic Conference:

When space is confirmed before noon the last normal business day before departure, ticket must be picked up by 12:01 a.m. the day of departure, or six hours before departure, whichever is earlier. Otherwise, reservation will be canceled.

- When space is confirmed after noon the day before departure, ATC sets no limit, but airlines are encouraging early pickup and a few are requiring it.

ATC suggested that a ticket could be bought (1) at the airline's ticket office, (2) at a "ticket pickup loca-

tion"—a place other than a ticket office, such as a drugstore, etc., (3) through bank depository, (4) at another line's office, (5) from a travel agent, (6) by U.S. mail, (7) by pre-paid telegraphic money order, (8) by ticket delivery service at the passenger's expense.

MTLs don't apply when a passenger says he can't use any of these methods and (if within 48 hours of deadline) the cost of a money order or delivery service would exceed \$2.01 or 10% of the fare, whichever is less. If an air travel cardholder's reservation is made within 48 hours of MTL, he is allowed to give his card code designation and account and serial numbers to the airline on the phone. His ticket is held in "will call."

- Tickets-by-mail works as follows: passenger mails check, airline mails ticket or holds in "will call." Travel plan cardholders are mailed tickets together with transportation re-

	Ticket limit on reservations made before noon the day before departure	Limit on reservations made after noon the day before departure	Ticket limit on reservations made before noon the day before departure	Limit on reservations made after noon the day before departure
ALLEGHENY	Ticket office closing time in each city.	No limit.	NORTH CENTRAL	N.A.
AMERICAN	6 p.m. day before departure, but supervisors authorized to allow 12:01 a.m. if necessary.	No limit.	NORTHEAST	No limit.
BONANZA	6 p.m. day before departure.	Desire 6 p.m. day before, but will hold until departure.	NORTHWEST	More than 8 days ahead, pick up 6 p.m. 7 days ahead. Eight days or less, 6 p.m. 2 days after confirmation. Within 2 days of departure, 8 p.m. day before departure.
BRANIFF	12:01 a.m.	No limit.	OZARK	Space confirmed week or more ahead, recommend pickup 48 hrs. before departure. Less than a week, 12:01 a.m. day of departure.
CAPITAL	12:01 a.m.	30 mins. before departure.	PIEDMONT	Closing time of airport or city office.
CENTRAL	12:01 a.m. except where offices close earlier. Office closing time is deadline.	No limit.	SOUTHERN	12:01 a.m.
CONTINENTAL	Same as Central.	No limit.	SOUTHWEST	Station closing time in each city.
DELTA	12:01 a.m.	No limit.	TRANS-TEXAS	(Applies MTL on interline business only.)
EASTERN	12:01 a.m., except where offices close earlier. Office closing time is deadline. More than 2 weeks ahead, try for pickup within a month, but not less than 2 weeks of departure.	No limit.	TWA	12:01 a.m.
FRONTIER	Station closing time, which is usually close to 12:01 a.m.	No limit.	UNITED	Try for advance pickup. But if passenger fails to pick up by agreed time, UAL won't cancel until 12:01 a.m. If space is tight, passenger will be checked by phone.
LAKE CENTRAL	Closing time of ticket office.	30 mins. before departure.	WEST COAST	Station closing time in each city; generally 5 to 7 p.m.
MOHAWK	5 p.m. day before departure.	No limit.	WESTERN	12:01 a.m.; stricter limit 30 mins. before planned for peak periods.
NATIONAL	Reservations made more than 7 days in advance, pickup within 48 hrs. from booking. Within 7 days, pickup by 3 p.m. next day or 6 hrs. before departure, whichever is earlier.	Reservations made in last 24 hrs. require 6-hr. pickup. Reservations made in last 3-4 hrs. require 1-hr. airport deadline.		
NOTE: For brevity, "12:01 a.m." is used in the table to signify ATC minimum of 12:01 a.m. the day of departure, or six hours before flight, whichever is earlier. In all cases, airlines emphasize that they try for earlier ticket pickup than ATC minimum. In second column, "no limit" means that although pickup is encouraged, airline will hold space until check-in.				
N.A. Not available.				

ceipts, which are signed and returned. Mail, of course, can't be used within about 48 hours of the time limit, in most cases.

"It's our plan to make ticketing by mail the Number One ticketing medium for our passengers," says Harding Lawrence, v.p.-traffic and sales of Continental. "We believe it's the easiest . . . most economical method for the passenger as well as for the company."

"TWA is doing all possible to encourage accredited firms to use our Tele-Mail plan wherein we mail the ticket with a statement of charges and a self-addressed stamped envelope," says Russ Petite, TWA's reservations director.

* The bank depository plan is generally as follows: passenger goes to a bank in his area with which the airline has made arrangements. He deposits his fare to the airline's account, receives a deposit slip which is his receipt. Bank notifies airline of deposit. Ticket can be mailed or held in "will call." Eastern has an arrangement with the Bank of Virginia in Richmond under which the bank's branches actually issue tickets and receive payments. Northwest's passengers can deposit fares at certain Twin Cities banks, receive cashier's checks made payable to NWA. Bank notifies the airline of passenger's name, amount collected, flight, etc.

Airlines using banks, or considering their use, include Southern (one of the first, with arrangements in 16 of 30 cities), American (considering extension of a plan used in Westchester County), Trans-Texas, Continental, TWA, Piedmont, NWA, Western.

On the other hand, very few lines so far have considered establishment of ticket pickup points, although this may come later. Northeast uses Western Union offices in Houlton, Laconia, Berlin, Keene, Greenfield and Athol. Continental is using pickup points in two towns where it doesn't have ticket offices. Ozark may have a few. TWA and UAL are exploring the idea.

Lack of Uniformity

Non-uniformity of time limits is illustrated by the fact that American and Bonanza require ticket pickup by 6 p. m. the day before departure on reservations made before noon of that day. AA, however, says it will make exceptions. Others push for as early a pickup as possible, but fall back on the ATC rule of 12:01 a. m. the day of departure, or six hours before flight, whichever is earlier.

Still others, notably local service lines, specify that office closing time is the limit (i.e., deadline would be 8 p. m. the day before departure, if that

So. Pacific Railroad Now Sells UAL Tickets

United Air Lines tickets are now being sold in about 130 station ticket offices of the Southern Pacific railroad in California, Oregon and Nevada where UAL has no office or representation.

This marked the first such arrangement between an airline and a railroad. SP took large newspaper ads, headed "Southern Pacific Sells Airline Tickets," explaining the new service and calling it a "good example of broad-minded cooperation between two forms of transportation to better serve the public interest."

Flight information, as well as UAL reservations and tickets, will be provided by the SP stations, which are linked with the railroad's central reservations bureaus in San Francisco, Los Angeles and Portland.

was closing time).

* There's mixed reaction to this lack of uniformity. Most officials don't think passengers will be confused, once they get used to the plan. They point out that limits have never been uniform.

A few disagree. "Can the agent be expected to keep track of the various MTLs of all the airlines?" asks a local service v.p. And a trunk v.p. disagrees with the 6 p. m. limit because it's "not uniform with that which most carriers will be telling their customers." Also 6 p. m. is a busy time in most offices, and the added ticketing may result in jam-ups, he contends.

* Biggest disagreement is over the cost of MTL. Carriers fall into three groups: (1) there will be added cost, (2) no added cost, (3) no estimate of cost.

United estimates that additional manpower and communications equipment will cost about \$400,000 annually, but adds that it may change this estimate after experience with the plan. Continental estimates \$163,000 annually, not including a \$4,000 initial training program. Trans-Texas expects to spend at least \$45,000 a year. NWA feels MTL will "incur costs not now necessary. Normally, we plan to reduce our field staffs in October and November. Depending on the additional workload, we may find we can't make the usual seasonal cutbacks."

Equally positive that there won't be added cost are several other lines. "Sufficient savings will come from elimination of unproductive effort that no noticeable cost increase will occur

. . ." says Braniff. Western foresees no increase "but, rather, a redistribution of present costs, since what we're doing basically is redistributing the workload." Ozark remarks that if no-shows from connecting trunks can be eliminated "our cost . . . could be completely eliminated by the added revenue."

Most emphatic is American, which anticipates that "any additional costs . . . will be more than offset by the reduction in work in connection with multiple reservations and no-shows . . . Telephone conversations may be lengthened slightly . . . but . . . the advantages of having the passenger have a ticket which agrees with his reservation before he gets to the airport will materially reduce workload at that point.

"Because that workload has had a tendency to bunch up in the few minutes before departure, requiring, in effect, five agents to handle five customers so as to get the ticketing done in time for . . . departure, a reduction in the number of ticket agents needed at airport ticket offices can unquestionably be achieved by reducing these peaks . . ." ♦♦♦

CAB Formalizes 'Press Release' Decisions

Civil Aeronautics Board has issued formal opinions and orders in two route cases in which it previously announced findings in "press release decisions" dated August 9.

In one, the Florida-Texas Case, CAB granted National Airlines a three-year extension from New Orleans to Houston to make possible a through one-carrier trans-Gulf service between Miami and Houston. Award becomes effective Nov. 20, and reflects a 5-0 CAB vote for NAL. Unsuccessful applicants in the case were Eastern Air Lines, Braniff Airways and Delta Air Lines.

Other case involved local service in the Erie-Detroit area. Board voted 5-0 to extend Lake Central Airlines' route from Youngstown, Ohio to Erie. It also voted 5-0 on the need for service between Erie and Detroit, but Member Harmar D. Denny dissented from a majority finding that both Allegheny Airlines and Mohawk Airlines should be certificated between those points.

Without specifying which carrier he would choose, Denny said only one should get the route. Allegheny's award is a straight Erie-Detroit extension; Mohawk's is from Buffalo to Detroit via Erie. Awards to LCA, Allegheny and Mohawk are for five years commencing Nov. 19.

Coming October 20th...



Braniff's fabulous version of the Douglas DC-7C—world's finest aircraft



Named for the golden regions it will serve, Braniff's El Dorado fleet of DC-7Cs will open a golden era of air travel. Here's never-before luxury at no extra fare!

Only on Braniff will travelers enjoy the super-quiet of El Dorado, the deeper relaxation of full-length reclining chairs, the refreshingly colorful lounge and the elegance of Braniff's internationally famous cuisine.

The huge, swift El Dorado has a non-stop range of over 5000 miles. Radar will point the way to the smoothest flight path.

Braniff's El Dorado will serve New York/Newark, Washington, Dallas and San Antonio; also Chicago, Dallas and Houston, with both first class and tourist accommodations. Soon El Dorado flights will be extended to Braniff's South American routes . . . joining our El Conquistador flights between the Americas.

"A pilot's airplane," said one aircraft company executive.
"A traveler's dream," passengers will say.



BRANIFF International AIRWAYS

141 offices throughout the Americas

General Offices: Dallas, Texas

Lockheed Begins Electra Production; Payload Boosted to 21,638 Pounds

Lockheed Aircraft's California Division this week erased any doubt as to the production status of its Electra turboprop as it began to "cuttin'" for the new transport.

At the same time, Lockheed v.p. and general manager Burt C. Monesmith disclosed that the Electra's payload has been hiked 20% to 21,638 pounds. He says that now, more than ever, the company's management is convinced of the soundness of its original premise—that turboprop power is best and will continue best for the

short and medium routes which carry 60 to 70% of all traffic.

The new Electra payload figure, Lockheed officials point out, is greater than for any of today's luxury transports. Yet with the increase of 3,638 pounds, Lockheed managed to hold gross takeoff weight to 113,000, only 3,000 pounds over its former 110,000-pound gross.

Monesmith reports design work on the Electra is now 80% complete, more than 500 blueprints finished and engineering time has topped 1,250,000

hours. At this point, more than 100 staff and research engineers are assigned to the Electra project.

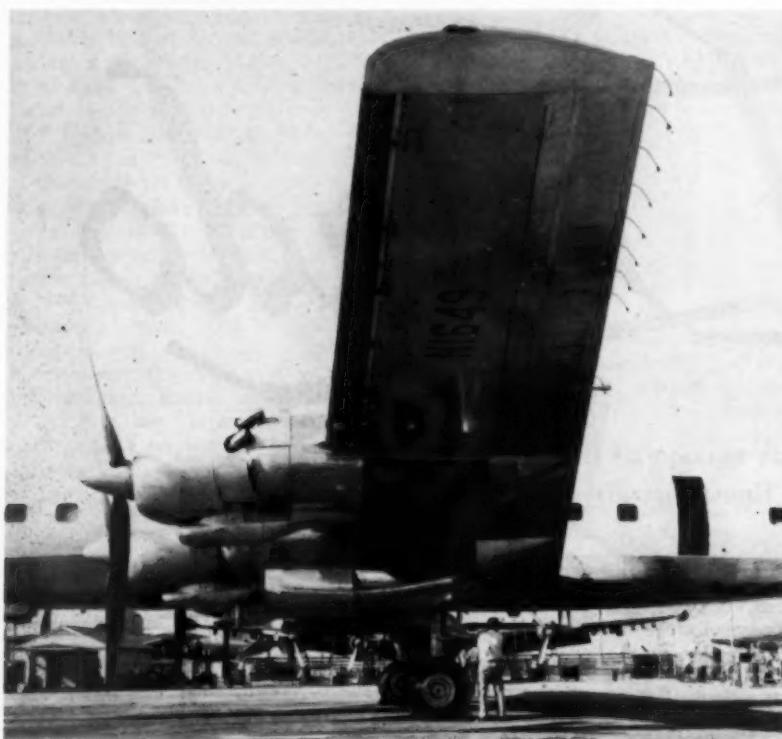
• Big point made by Lockheed in pitting the Electra against straight-jet competitors is its comparative airport-to-airport and downtown-to-downtown elapsed times.

Up to nearly 1,000 miles, Electra block time is within minutes of the jet. Between Cleveland and New York (420 miles), it will take 1 hr. 20 mins. compared to 1 hr. 2 mins. for jets.

In New York-Chicago operations, it adds, figuring mid-Chicago to mid-Manhattan times, the Electra passenger will arrive ahead of the jet traveler by avoiding the remote jet fields at Chicago's O'Hara Field and New York's Idlewild. Instead, the Electra can operate into Midway and O'Hara, both closer-in and with runways too short to take jets, Lockheed notes.

The company figures that present orders for 128 Electras by six carriers plus options represent an estimated \$235-million backlog. Airlines include American (35), Eastern (40) National (23) Braniff (9), KLM (12) and Western (9).

Lockheed Rolls Out Its Star



First Lockheed Super Star Constellation rolls out of final assembly hangar at Burbank preparatory to first flight scheduled for this week. Front view emphasizes reduced frontal area gained from new thin wing. Its 150-foot span is 27 ft. longer than Super Constellation and 200-sq.-ft. increase in wing area increases fuel capacity to 9,600 gallons. Following six-month test program and CAA certification, 1649A will be introduced in schedule service by Trans World Airlines in April 1957.

Non-Sked Decision Headed for High Court

Civil Aeronautics Board's controversial decision in the Large Irregular Air Carrier Investigation is still tied up in the courts and may be headed for Supreme Court review.

Challenged by the scheduled airline industry, the decision was upset in July by the U.S. Court of Appeals. Late last month, the Appeals Court stuck to its ruling by denying rehearing requests of CAB and various non-scheduled airline interests.

Routine legal maneuvers, however, have resulted in a temporary stay of the Appeals Court verdict. Non-sked interests have asked for a stay pending filing of a petition with the Supreme Court.

CAB asked for a stay until it can make up its mind whether or not to go to the Supreme Court.





TWA SLEEPER SEATS

TO EUROPE! AT NO EXTRA FARE!



Flying TWA First Class to Europe? TWA's Sleeper Seats mean new luxury for you . . . without extra charge! Beginning October 28th!

Our sleeper seats are the stuff that dreams are made in!

You can stretch out full length . . . legs and all . . . in deep-cushioned comfort for a cat-nap or hours of relaxing sleep!

You fly with veteran transatlantic flight crews . . . aboard magnificent TWA Super-G Constellations . . . world's quietest, most luxurious, long-range airliners. Enjoy spacious, beautifully decorated cabins . . . visit the smartly appointed "Starlight Lounge." Complimentary beverages and delicious meals are served by gracious TWA hostesses. For reservations, see your TWA Travel Agent or call your nearest TWA office.

FLY THE FINEST
FLY TWA

U. S. A.-Europe-Africa-Asia

**FOR SAFETY
AT LOW COST...
BIL-JAX**



- PASSENGER RAMPS
-
- WORK PLATFORMS
-
- BAGGAGE LOADING CARRIERS
-
- MAINTENANCE STANDS

All-welded tubular steel construction. Simple, sturdy design. Easy maneuverability. Write today for information on complete line.

BIL-JAX INC. ARCHBOLD OHIO

Circle No. 20 on Reader Service Card.

split second action

SAFETY WIRES 3 TIMES FASTER

A major Air Force base cut engine wiring time from 120 to 40 man-hours . . . saved \$140 per engine. Manufacturers report time cut as much as 75%.

Simply grip wire, pull knob . . . zip, wire's twisted. Three tools in one . . . cutter-pliers-twister. Two sizes: 12" and 9" for assembly or bench work.

Write for folder.



RALPH C. ROBINSON COMPANY
Box 3494M, N. Sacramento, Calif.

Circle No. 21 on Reader Service Card.

Growth of Airfreight Forwarders Cuts into Revenue of Airlines

By WALLACE I. LONGSTRETH

There are increasing signs that some of the nation's scheduled airlines are looking for an easy way to stem the growing power of airfreight forwarders who last year controlled approximately 20% of the domestic airfreight business.

At year's end there were 54 forwarders filing reports with Civil Aeronautics Board. As a group, they bought \$12,757,431 worth of air transportation in 1955 for 393,213 shipments weighing 48,767 tons. Thirty-seven forwarders delivered more than 100 tons of airfreight each, with nine averaging more than 1,000 tons (see table).

Through their efforts to get a slice of the business controlled by forwarders, the airlines have made it possible for these concerns to offer services and rates more attractive to the shipper than those offered by the carrier. And now that the forwarder has control of so much business, there is general reluctance to be the first airline to cut off preferential treatment for them.

Yet it is recognized that the concessions made by airlines to these firms makes for better forwarder service, which in turn promotes more business for the forwarder and strengthens his position in bidding for more concessions.

Emery F. Johnson, president of Air Cargo, Inc., summed up the situation this way:

"He (the forwarder) has grown and continues to grow at an alarming rate, which if projected into the future, would conceivably indicate that at some not too far distant year he will be receiving all shipments from the public

to the complete exclusion of the air carriers themselves.

"In short, we will have another Railway Express Agency situation, but without the benefit of any partnership agreement and with a group of partners over whom we have no choice or control in the first place. We will simply be underlying carriers—to be selected or discarded at random."

Air Cargo, Inc., wholly owned by the airlines, was set up 10 years ago to handle terminals, surface transportation, and tariffs for the scheduled airlines' airfreight business. The surface transportation phase has become the most important part of ACI, which in 10 years has handled 8,600,000 shipments worth \$13 million in cartage revenues.

At the ACI cartage conference in New Orleans, Johnson pointed out that freight-wise the airlines are in the small package business, and for the foreseeable future will continue to handle small shipments. Average shipment handled by the airlines' ground service organization weighs 131 pounds, he said. "And," Johnson noted, "every other single transportation agency—including the highly successful airfreight forwarder—provides door-to-door service for this kind of business."

In providing door-to-door service, the ACI operation requires combining pick-up, line haul, and delivery charges. Johnson believes that publication of door-to-door rates would put the airlines and ACI in a much better competitive posture.

Johnson said that time on the ground and cost of the surface portion of airfreight shipments could stand improvement. Based on the average ship-

Top Nine Forwarders In 1955

(Ranked in the order of the amount of air transportation purchased from the scheduled airlines.)

Forwarder	Gross Revenue	Paid To Air Carriers	Shipments delivered to scheduled airlines	
			Number	Tons
Emery Air Freight Corp. . .	\$7,442,278	\$3,064,318	156,723	14,680.6
American Shippers, Inc. . .	2,573,543	1,790,381	40,184	4,961.0
Airborne Flower & Freight Traffic, Inc. . . .	1,725,134	1,144,951	55,868	7,866.3
Air Express International Corp. . . .	1,779,500	882,042	11,988	1,013.6
Acme Air Cargo, Inc. . . .	651,734	517,066	1,558	1,617.0
Wings & Wheels Express, Inc. . . .	907,693	506,915	9,745	2,429.4
ABC Air Freight Co. . . .	690,457	470,798	12,608	2,222.1
United Parcel Service-Air . . .	571,197	360,928	8,816	1,016.8
Allied Air Freight . . .	413,976	341,997	4,580	1,564.2

(From statistics compiled by the Civil Aeronautics Board.)

ment (131 pounds), ground service charges account for 26% of the shipper's total cost. This pays for approximately 90 miles of ground travel, while the remaining 74% pays for 1,729 miles of air transportation.

As to time involved, Johnson cited the New York-to-Chicago haul where ground-handling consumes 81% of total time in transit. From New York to Los Angeles, ground-handling takes 42% of time from shipper's dock to consignee's door if next-day delivery is made, but 67% in the "likely event

of second-morning delivery."

Whether any airline will go for door-to-door rates, or seek even another means to compete actively for the business now controlled by forwarders, remains to be seen. ACI and the cartage agents are prodding, with the argument that if airlines could move in on a substantial portion of the forwarders' business, the increased volume would permit lower pick-up and delivery charges and more frequent trips to and from the airports by ACI's trucks. ***

LCA Employees Win Court Verdict

U.S. District Court in Indianapolis has ruled in favor of the Lake Central Airlines Employes Group in the dispute with North Central Airlines over controlling stock interest in LCA. Federal Judge William E. Steckler ruled that North Central had "materially breached" a contract under which it was to acquire control of LCA.

The dispute goes back to 1952 when CAB ousted LCA's management and directed principal stockholders—John W. Weesner, W. W. Weesner and Roscoe Weesner—to liquidate their holdings, which amounted to some 80,000 of LCA's 83,000 outstanding shares. Pending liquidation, the stock was placed in trust and an interim management named.

NOR entered a contract to purchase the Weesners' stock and thereby acquire LCA. It also applied to CAB for approval of the proposed acquisition. Progress was slow on those two moves and, in early 1955, LCA employees banded together and entered an agreement to purchase the Weesner stock, subject to the prior rights of North Central.

* LCA employees then filed in court for a declaratory judgment that NOR had breached the original contract thus rendering it invalid. That action was upheld by Judge Steckler last month.

Meanwhile, the CAB case is still in progress. CAB Examiner Paul N. Pfeiffer has recommended approval of North Central's acquisition of LCA and the matter is slated for oral argument before the Board on October 17.

However, Lake Central, on the strength of its recent court victory, said it will ask CAB for an immediate decision in the Acquisition Case which, of course, would be a request for disapproval of the agreement.

NOR said it intends to appeal Judge Steckler's ruling to the U.S. Court of Appeals and can be expected to oppose LCA's intended CAB request.

The situation, therefore, is this: If CAB grants LCA's request and disapproves the Acquisition Agreement, the

UAL Doubles Orders For Douglas DC-7s

United Air Lines has doubled an April 1955 order for 15 Douglas DC-7s bringing its total DC-7 fleet, when delivered, to 57 planes.

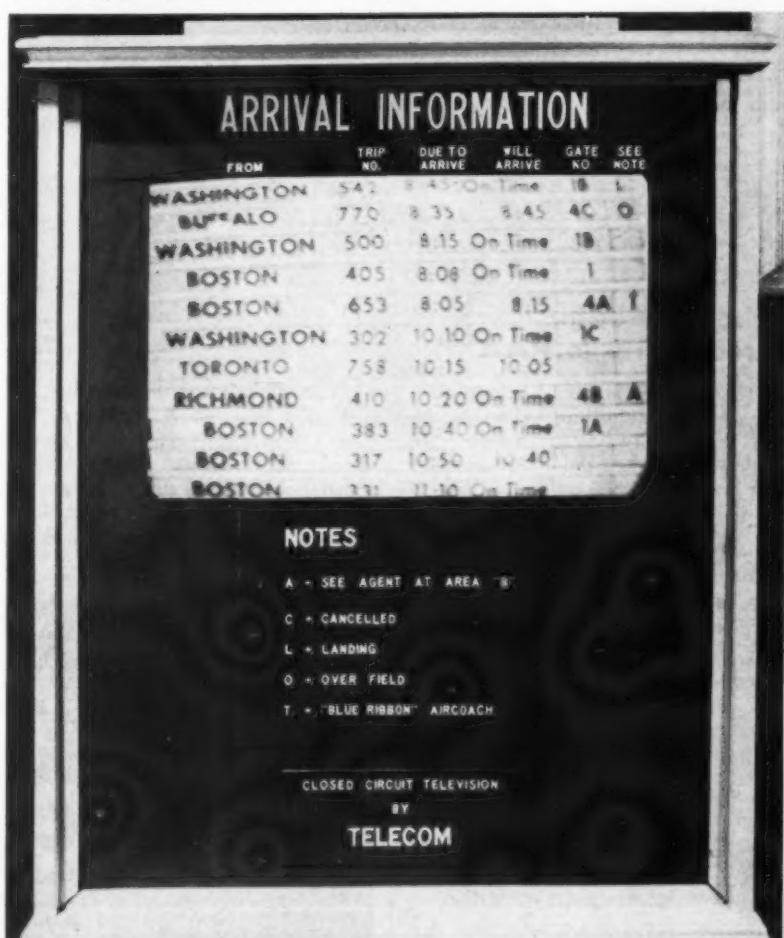
The new order also makes UAL the biggest buyer of Douglas four-engine transports with a total of 151 DC-6/DC-7 types on order and delivered.

United originally ordered 25 DC-7s, delivery of which was completed in January 1955.

A later order for two more DC-7s raised the figure to 27 and, in 1955 United again reordered 15 more DC-7s for a total of 42.

To date UAL has received 27 deliveries which, with the new order, leaves 30 still to come. Of its total 151 Douglas transports, 108 have been received.

AA Approach to TV Flight Info



Experimental closed-circuit TV installation by American Airlines at New York's La Guardia Field lists flight information in chronological order. Three 27-inch monitors are located in AA's passenger concourse. Equipment was developed for American by Telecom Systems, Inc.

Summary of U.S. Airline Traffic for July, 1956 vs. July 1955

Compiled by American Aviation Publications from Official C.A.B. Data.

Airlines	Revenue Passengers (In Thousands)			Revenue Passenger Miles (In Millions)			Total Ton-Miles Rev. Traffic (In Millions)			% Available Ton-Miles Used	
	1956	1955	% Change	1956	1955	% Change	1956	1955	% Change	1956	1955
D O M E S T I C											
American	634,616	637,705	-0.5	428,328	396,934	7.9	48,537,532	44,873,826	8.2	56.95	59.14
Braniff	134,287	137,241	-2.2	55,463	52,193	6.3	5,595,706	5,509,014	8.2	48.96	52.85
Capital	239,350	237,008	1.9	81,537	73,854	10.4	8,479,174	7,817,255	8.5	40.55	43.70
Continental	56,594	n.a.	...	21,539	20,362	5.8	2,262,250	2,135,057	6.0	44.17	45.58
Delta	182,444	170,221	7.2	87,436	77,515	12.8	9,444,592	8,373,318	12.8	51.25	58.20
Eastern	585,810	536,839	9.1	291,780	266,708	9.4	31,806,831	29,126,838	9.2	44.84	48.87
National	105,678	98,026	7.8	72,160	68,645	5.1	7,951,755	7,495,880	6.1	64.26	69.21
Northeast	69,329	80,670	-14.1	13,993	16,040	-12.8	1,327,529	1,527,934	-13.1	55.34	59.15
Northwest	116,138	121,751	-4.6	82,633	85,659	-3.5	9,303,848	9,478,771	-1.8	52.62	58.42
TWA	336,498	345,104	-2.5	296,076	283,417	4.5	31,541,014	30,470,577	3.5	60.70	62.56
United	541,760	514,655	5.3	338,383	361,581	10.2	45,144,009	40,755,927	10.8	58.64	61.37
Western	97,574	101,191	-3.6	50,518	49,717	1.6	5,266,098	5,190,100	1.5	52.43	56.38
TOTALS	3,100,078	2,980,411	7.8	1,879,846	1,752,625	7.3	207,024,338	192,754,497	7.4	53.88	56.93
I N T E R N A T I O N A L											
American	12,372	12,145	1.9	9,208	8,833	4.2	1,264,805	1,093,802	15.6	65.65	71.16
Braniff	2,974	3,443	-13.6	6,399	7,480	-15.3	803,417	848,312	5.3	57.19	45.32
Delta	5,274	4,385	20.3	5,638	4,867	15.8	623,031	545,654	14.2	48.20	39.14
Eastern	31,102	20,144	54.4	41,570	29,011	43.3	4,525,955	3,181,730	42.2	69.27	73.31
National	10,526	10,483	0.4	5,176	4,958	4.4	567,606	546,345	3.9	49.98	50.23
Northwest	11,544	10,273	12.4	22,703	21,691	4.7	4,049,297	3,742,328	8.2	71.06	68.67
Panagra	12,357	11,782	6.6	15,014	14,754	1.8	1,951,309	1,906,194	2.4	58.46	58.57
Pan American											
Latin Am.	125,685	105,255	19.4	121,300	102,634	18.2	14,633,436	12,391,872	18.1	65.57	66.34
Atlantic	107,057	98,180	9.0	138,559	132,874	4.3	16,954,057	15,862,122	6.9	59.85	70.76
Pacific	29,096	21,260	36.9	81,838	64,130	27.6	10,653,092	8,653,602	23.1	71.58	69.15
Alaska	9,127	9,710	-6.0	9,339	13,831	-32.5	1,455,836	1,762,103	-17.4	61.84	56.51
TWA	31,044	29,918	3.8	82,346	79,574	3.5	9,970,384	9,634,635	3.5	69.87	73.76
United	12,189	10,694	14.0	30,258	26,537	14.0	3,216,384	2,847,000	13.0	76.29	76.81
TOTALS	400,547	347,672	15.2	569,348	511,174	11.4	70,668,609	63,015,699	12.1	65.61	68.17
L O C A L S E R V I C E											
Allegheny	36,069	38,384	-6.0	6,024	6,272	-4.0	602,148	619,955	-2.9	41.71	48.73
Bonanza	10,414	10,101	3.1	2,260	2,163	4.5	228,311	215,476	6.0	39.69	40.91
Central	8,003	8,845	-9.5	1,531	1,313	16.6	157,420	134,633	16.9	28.34	26.68
Frontier	17,481	18,086	-3.3	4,421	4,492	-1.6	502,990	515,383	-2.4	56.06	59.63
Lake Central	10,788	11,164	-3.4	1,664	1,636	1.7	162,954	159,006	2.5	33.08	30.21
Mohawks	27,120	24,932	8.8	4,900	4,455	10.0	488,572	441,940	10.6	47.50	50.47
N. Central	51,255	46,408	10.4	8,388	7,410	13.2	847,191	749,547	13.0	46.19	48.93
Ozark	26,481	21,813	21.4	4,096	3,212	27.5	415,594	317,923	30.7	34.39	36.66
Piedmont	36,207	35,633	1.6	6,904	7,012	-1.5	635,033	703,335	-1.2	51.27	57.30
Southern	15,565	14,575	6.8	2,759	2,471	11.7	285,253	253,374	13.0	39.56	38.81
Southwest	26,173	25,552	2.4	5,112	5,033	1.6	506,492	498,440	1.6	47.23	58.05
Trans-Texas	18,492	13,784	34.2	4,251	3,156	34.7	448,864	330,131	36.0	33.84	36.62
West Coast	19,445	19,822	-2.4	3,305	3,456	-4.4	309,764	323,522	-4.3	43.92	47.03
TOTALS	303,513	289,199	4.9	55,615	52,081	6.8	5,650,582	5,262,665	7.4	42.72	46.53

* 1956 Figures Include Colonial-Eastern merger.

Fairchild Resigns Directorship in PAA

Sherman Fairchild relinquished his 28-year directorship in Pan American World Airways last month with a plea for modernization of the rules which forced his retirement from PAA's board.

The founder and a director of Fairchild Engine & Airplane Corp. was ordered by the Civil Aeronautics Board to give up either his PAA office or that with FEAC. Board action was based on a rule which prohibits one man from holding joint directorate which the agency feels will be adverse to the public interest.

Fairchild's joint holdings ran afoul of the CAB rule when FEAC contracted to manufacture the Fokker-type F-27 turboprop plane. Since PAA or its subsidiaries are potential customers for the F-27, CAB ruled that Fairchild must sever his relations with one of the companies.

Actually, the CAB decision wa-

reached almost 18 months ago but had been stayed numerous times as PAA sought reversal of the action. Final stay was terminated Sept. 24.

Fairchild joined PAA's board in 1928 at a time when PAA had "less than 12 employees." He owns an estimated 11,700 shares of PAA stock which holdings are unaffected by the CAB ruling. In his resignation letter to PAA president Juan T. Trippe, the retiring director said:

"I am strongly in favor of the purpose of the regulations in attempting to protect employee and stockholder relations. However, I feel that a Congressional review and modernization of regulations written in the infancy of air transportation might provide a wider scope for CAB interpretation. The advance of aviation requires directors with the broadest experience and a way should be found for them to continue."

WORLD'S PREMIER AIRPLANE FABRIC

FLIGHTEX

FLIGHTEX FABRICS, Inc. • 93 WORTH STREET • NEW YORK 13, N.Y.

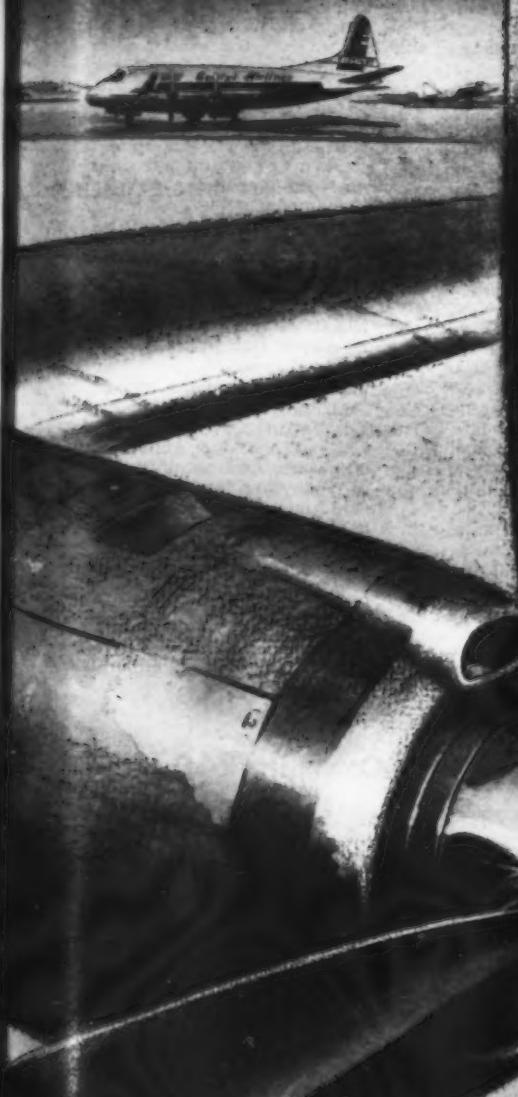
Leading Manufacturers of
Fabric and Tapes for the
Aircraft Industry.

Export Representative
AVIQUIPO, Inc.
25 Beaver Street, N.Y.
Cable: Aviquipo

Circle No. 13 on Reader Service Card.

AMERICAN AVIATION

1,200,000 Flying hours...



ROTOL Turbo-Propellers

Have completed over 1,200,000 flying hours.

The standard equipment for over 300 Viscount aircraft.

THE OVERHAUL LIFE OF THE PROPELLER IS NOW OVER 1,600 HOURS.

ROTOL · GLOUCESTER · ENGLAND

U.S.A. Representative: Vernon Crudge · Room 1501 · 630 Fifth Avenue · New York 20

Airline Commentary

By Eric Bramley

We like the story of how Eleanor Wilson, a stenographer for Pan American World Airways in Miami, traveled from that city to Vancouver, B.C., recently. Seems she was a delegate to the convention of the Toppers, an organization of extra-tall men and women, but the Miami club didn't have funds to pay her transportation. And she wanted to sell the Toppers on having their 1957 meeting in Miami. So she used her vacation privilege—10% of regular fare (on-line). Flew PAA to Havana, Guatemala, San Francisco, across the Pacific to Honolulu, then back to Seattle, which ain't far from Vancouver. Returned the same way. Round-trip was almost 19,000 miles. Sewed up the convention for Miami next year. Trip cost around \$100, compared with \$950 regular fare. Enterprising young lady, Miss Wilson.

* * *

Airlines are awarding bigger and bigger bundles of cash in employes' suggestion contests. Money well spent, too, because these suggestions save the companies thousands of dollars. But we're intrigued by the fact that the awards always seem to go to mechanics who think up new types of welding, better fuel mixtures, etc. Question: Doesn't anyone in sales and traffic ever come up with a good idea?

* * *

United Air Lines Capt. Frank X. Ryan, in a column he writes for UAL News, prints the following gem: It concerns the caterpillar that watched a moth in flight and then remarked: "You'll never get me up in one of those things!"

* * *

We call the attention of sales managers to a new film, "Mr. Withers Stops the Clock," now being released by the Air Transport Association. Purpose is to show the importance of an airport to a community. Done in entertaining style, the film does a good job of getting across its message of how people would be affected if an airport were to be closed suddenly. It's 27 minutes, sound-and-color, and we recommend it highly for showings to clubs, civic groups, etc.

* * *

A tip of the hat to Earl Wadsworth, who is retiring as director of the Post Office Department's division of air service. Earl, a 40-year veteran with the PO, helped lay plans for the first civilian air mail service in 1918, and has seen the system grow to its present size. An able public servant, he'll be missed.

* * *

Sales, Traffic, Promotion

Northwest Airlines passengers traveling between Seattle/Tacoma and Honolulu are now given souvenir, in-flight pictures of themselves. Polaroid cameras and flash equipment have been issued to stewardesses, who snap pictures and develop them immediately...

National Airlines and **TWA** have announced that they are installing Teletel Corp.'s Magnetronic Reservisor, electronic reservations system. Both installations will be completed in the fall of 1957. TWA will have Reservisors in New York, Chicago and Los Angeles, with a remote tie-in to San Francisco. Further extensions will be recommended to management later. NAL will have agents' keysets in New York, Philadelphia, Washington, Norfolk, Jacksonville, Tampa, Miami and New Orleans, with other cities linked to the network by teletype. In addition to keeping track of seat availability, Reservisor will tell status of any flight on the current day—whether it's on time, late, how late, or canceled. NAL says it will have in operation this fall a "less elaborate electro-mechanical reservations system," also furnished by Teletel...

Ozark Air Lines promoting sales by making reservations at its ticket offices for all 1956 home games of the Chicago Cardinals pro football team. Airline's offices have teletype hookup with Cardinals' office in Chicago...

Delta is installing an outdoor display on the turnpike between Newark and Lincoln Tunnel, describing com-

pany's service to and from New York... Hickok, makers of men's jewelry, will market a Golden Crown tie clasp, after Delta's flights of the same name... Ten new 22-by-28-inch posters, featuring Delta cities, will make their appearance this fall...

Brochure containing handy conversion scales for clothing sizes in the U.S., England and Switzerland is now available from **Swissair**, 10 W. 49th St., New York... Swissair's first-class Atlantic passengers are now offered imported caviar as an appetizer, served with French champagne...

TWA has opened an Ambassadors' Club at San Francisco International Airport... National Airlines sold more "Piggy Bank Vacations" through August than the total sales from 1949 through 1952. Month of August was 24% ahead of same month last year. Fall bookings are heavy...

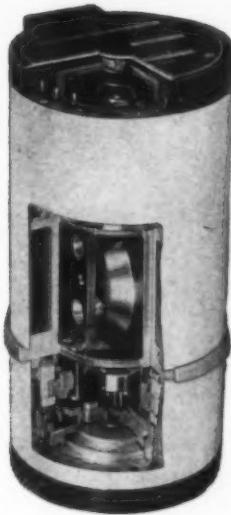
New ticket and sales offices: **National Airlines**, Mellie Esperson Bldg., Houston; **Japan Air Lines**, Rockefeller Center, New York; **Pan American** moving Paris sales and administrative offices to 138 Avenue des Champs-Elysees. Complete move will require several months, but a provisional sales office is in operation at the new location...

"Sportsman's Guide to the Caribbean" has been written by Patrick Ellam and published by A. S. Barnes for British West Indian Airways. Available at \$1 per copy from A. S. Barnes, P. O. Box 260, Murray Hill Station, New York, N. Y...

Mohawk Modification of Convair 240



Mohawk Airlines is modifying its Convair 240s to include lounge in rear, increasing seating capacity to 42. Company also plans to install additional row of four seats in forward portion of cabin, for total of 46. Lounge, 52 inches wide, was made possible by removing buffet. Rear cabin bulkhead on left side was replaced by plexiglass bulkhead, giving full view of cabin.



This is a cutaway view of Honeywell's
HIG-5 hermetic integrating gyro. Compact:
six inches high. Accurate: measures the
thirteen-millionth part of a circle. Rugged:
takes 50 g's and more of shock. The HIG detects
and measures any attitude change of aircraft
or missiles. Three models of the
HIG (HIG-4, HIG-5, HIG-6) are in volume production.
They are recommended for radar stabilization,
flight control and inertial guidance.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL



Rolls Royce Thrust Reverser on Avon Engine

Louvres in rear of fuselage of this Hawker Hunter disclose that its Avon engine is fitted with a Rolls-Royce thrust reverser featuring internal jet deflectors.

Contracts

USAF Air Materiel Command announced the following contract awards:

Rand Corp., Santa Monica, Calif., \$10,469,000, to study preferred methods, techniques and instrumentation for development of airpower.

Douglas Aircraft Co., Santa Monica, \$4,279,692, air-to-air rockets.

Philco Corp., Philadelphia, \$2,876,000, technical services.

Gilfillan Brothers Inc., Los Angeles, \$2,711,279, technical services.

Bendix Aviation Corp., Red Bank Div., Eatontown, N. J., \$1,137,791, AC generators.

Federal Electric Corp., Lodi, N. J., \$7,750,000, equipment for DEW Line in Alaska and Canada.

Minneapolis-Honeywell Regulator Co.,

Minneapolis, \$6.8 million, armament control systems.

Western Union Telegraph Co., New York, \$5.6 million, automatic switching centers.

Tumpene Co., Vancouver, Wash., \$3.1 million, liquid oxygen.

Aircraft Engineering & Maintenance Co., Oakland, Calif., \$2.3 million, T-33 modifications.

Allison Div., General Motors Corp., Indianapolis, Ind., \$1.2 million, jet engine overhaul.

Commerce Dept. announced the following contracts, which are with USAF unless otherwise indicated:

United Aircraft Corp., \$48.6 million in Navy letters of intent for Sikorsky HSS-1, HU-1 and HR2S-1 helicopters.

Hughes Aircraft Co., Culver City, Calif., \$1,284,555, control surface kits for F-86Ds, and \$264,240, fire control systems.

B. F. Goodrich Co., Akron, O., \$1,172,807, aircraft boots.

Consolidated Western Steel Div., U.S. Steel Corp., \$1,355,555, missile stowage and launching equipment.

Curtiss-Wright Corp., Caldwell, N. J., three contracts totaling \$2,412,010, propeller repairs and spare parts; Wright Aero. Div., \$1,593,000, J65 overhauls.

Admiral Corp., Chicago, \$1,871,058, receiver-transmitters.

Batelle Memorial Institute, Columbus, O., \$1,000,000, titanium research.

Packard-Bell Co., Los Angeles, \$1,725,343, receiver-transmitters.

The following contracts were announced by companies:

Lycoming Div., Avco Mfg. Corp., Stratford, Conn., \$2,900,000 USAF contract to establish capacity and capability to produce the T53 shaft turbine engine.

Tulsa Div., Douglas Aircraft Co., \$34,711,559 USAF contract extending IRAN modification and overhaul work on B-47 bombers well into 1957.

United Aircraft Products Inc., Dayton, O., over \$3 million for furnishing de-icing cold weather oil system and hot fuel priming system for Boeing KC-97. Company will furnish systems under contract to Rohr Aircraft, which will make the installation.

Sperry Gyroscope Co., \$2,293,966 USAF contract for development of a microwave command electronic guidance system for advanced drone aircraft. Total award will amount to more than \$4.5 million.

Air Associates Inc., additional contract in excess of \$2.5 million from Hughes Aircraft Co. for research and development of advanced airborne communications equipment. This supplements initial \$5 million contract.

Examiner Recommends New AA, EAL Rights

American Airlines and Eastern Airlines have been recommended by CAB Examiner Walter W. Bryan for authority to compete with Trans World Airlines for non-stop business between St. Louis and New York. Currently, both AA and EAL are required to make one intermediate stop on St. Louis-New York flights.

Bryan also recommended elimination of existing two-stop requirements which prevent TWA from operating nonstop between Cincinnati and Washington and American from operating nonstop between Louisville and Washington.

DYNAMICS SUPERVISOR

To head group of engineers concerned with the dynamic characteristics of helicopters and convertiplanes. Must have degree and minimum four years experience in this field. Opportunities to grow with our expanding Helicopter Division. Send detailed resume to:

RAYMOND F. KALETTA, Technical Placement Supervisor
P. O. Box 516 • **ST. LOUIS 3, MISSOURI**

MCDONNELL *Aircraft Corporation*

FLIGHT TEST ENGINEERS

Senior Flight Test and Senior Data Analysis Engineers needed immediately for Airplane, Missile, and Helicopter Flight Test program. If qualified, send detailed experience resume to:

RAYMOND F. KALETTA, Technical Placement Supervisor
P. O. Box 516 • **ST. LOUIS 3, MISSOURI**

MCDONNELL *Aircraft Corporation*

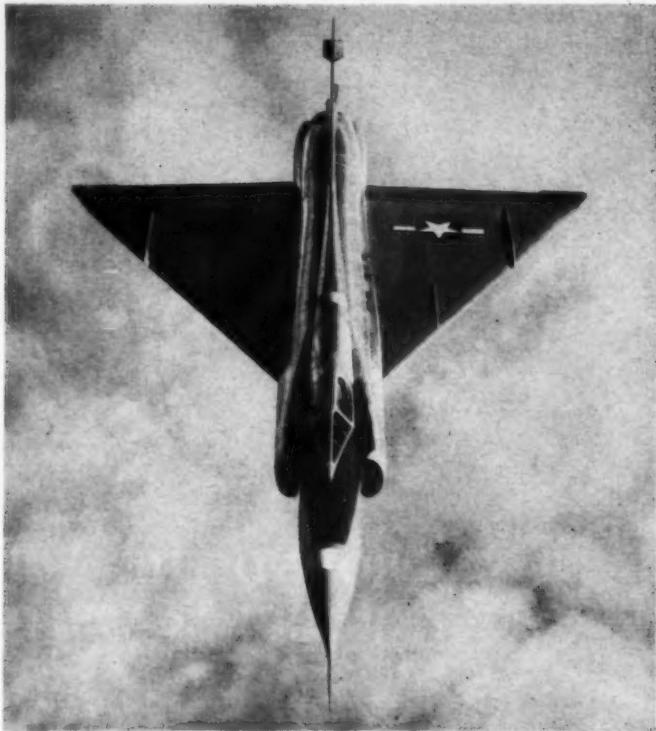


ROUND THE CLOCK... THROUGHOUT THE YEAR...

THERE'S MORE FUN
AND FUTURE AT
LOCKHEED IN GEORGIA

The hours at work are pleasant and rewarding in the calibre of your associates and the recognition of your efforts—the hours away from the job are rewarding in the opportunity of advanced study in exceptionally progressive atmosphere — the hours of leisure with your family and associates are exceptionally rewarding because of the round-the-clock — throughout-the-year advantages of climate — terrain — natural resources and developed recreational installations—so every hour—every day — there's more achievement and pleasure for you at Lockheed in Georgia—where two additional multi-million dollar developments are now underway — a separate Engineering Center and the huge new Nuclear Plane Project.

R. S. V. P.
ENGINEERING PROFESSIONAL PLACEMENT
LOCKHEED
AIRCRAFT CORPORATION DEPT. AMA-10B
761 PEACHTREE N. E., ATLANTA, GEORGIA



THE CONVAIR CHALLENGE TO THE ENGINEER OF EXCEPTIONAL ABILITY

Beyond the obvious fact that Convair in San Diego offers you a way of living judged by most as the nation's finest from the standpoint of weather, beauty and interesting surroundings, the Convair Engineering Department offers you challenges found in few places.

It is, we believe, an "engineer's" engineering department—interesting, energetic, explorative—with the diversity that means security for capable personnel.

As proof, consider this: Convair developed and flew the world's first turbo-prop airplane, first delta-wing airplane, first vertical take-off airplane, first delta-wing seaplane—engineered and built the world's biggest transport, the world's safest high-performance commercial aircraft.

Or this: Convair's B-36 is the world's largest operational bomber, Convair's B-24 Liberator was World War II's most used heavy bomber, Convair's XP5Y-1 holds the world's endurance record for turbo-prop aircraft.

Or this: Convair was awarded the nation's first production missile contract and the first production contract for supersonic interceptors.

Currently . . . Convair has the greatest diversity of aircraft engineering projects in the country, including the F-102A supersonic interceptor, the new Metropolitan 440 airliner, the Convair 880 jet liner, the Atlas intercontinental ballistic missile, plus a long-range study of nuclear aircraft.

Currently . . . Convair has a completely integrated electronic development section engaged in advanced development and design on missile guidance, avionic projects and radar systems.

Would you like to join us? We earnestly need engineers of proven ability—men who want to make full use of their time, their minds, their skills and abilities solving the complex problems confronting us in these projects. If you are such a man, write us and we'll send you a free booklet about us, plus other interesting material to help you make the decision.

Write: H. T. BROOKS, Engineering Personnel

Department 222

CONVAIR
CV A DIVISION OF GENERAL DYNAMICS CORPORATION GD

**3302 PACIFIC HIGHWAY
IN BEAUTIFUL SAN DIEGO, CALIFORNIA**



SUBJECT: Design Engineering

We need not tell you that an airplane like the CRUSADER (or a missile like the REGULUS) does not "just happen" after the preliminary design, air loads, and wind tunnel stages are nearly complete.

Your work is the difference between a mountain of figures and a completed airplane or missile.

That fact is easy to forget in this age of specialization, as emphasis seems to shift to the supporting activities.

However, it *should not* be forgotten that the designer-on-the-board is the professional engineer who assimilates the mass of data and performs the eternal compromises demanded in airplane design.

Without him (and his draftsmen) the airplane does not, and cannot, "happen."

At Chance Vought, we are trying our best to dem-

onstrate the importance of the designer — not only to him but to the rest of the engineering team.

This is our opportunity to tell designers everywhere that they are important and if recognition cannot be found in their present positions — then they should consider joining the engineering group whose teamwork designed the F8U-1 Crusader and is now designing even more advanced airplanes and missiles. Each engineer is on the team — and he knows he is needed!

We have positions available at all levels for designers in airframe and mechanical components design; armament, power plant, and electrical installation design; and production liaison.

Full company benefits include generous relocation allowances to Dallas, where we feel a real sense of personal freedom in our clean and uncrowded surroundings.

To arrange for a personal interview and a confidential evaluation of your qualifications, send a resumé of your background to:

**Dept. 10-1
Engineering Personnel**

CHANCE
VOUTH AIRCRAFT
INCORPORATED DALLAS, TEXAS

P. O. BOX 5907 • DALLAS, TEXAS



EN ROUTE . . .

WAYNE W. PARRISH

The Baboon Almost Won

As my friends would say, the baboon and I were so evenly matched intellectually that it's a wonder I was able to win the battle. For awhile I thought I'd sure lose.

It was on the Belgian Congo trip in Africa last June. The locale was Epulu, the elephant training center in the equatorial forest in the northeast. Stan Markussen of Sabena and I were in our cabin at the rest camp called the Auberge du Domaine des Okapi. It was late afternoon. Stan was taking a shower and I was re-arranging some stuff in my two-suiter.

I heard a racket outside our screen door and turned to see what was going on. Here was a baboon perched on a ledge looking in through the high screen window into the small bathroom. I yelled to Stan to take a look.

Just then the baboon jumped off the ledge and made a lunge for the screen door. I also made a lunge to make sure the door was locked. At the very moment I got my hand on the handle on my side, the baboon got a firm grip on the outside handle. If I had been a split-second later, the danged beast would have had the door open and into our room tearing up everything in sight.

I had quite a time holding the inside handle up while old playful babbo was trying to pull it down on the outside. He seemed quite determined to come in. Such a lot of chattering and screaming I never did hear. In a way I felt pretty silly standing there trying to keep a baboon out of the place and I remarked to Stan that nobody would ever believe it.

Pretty soon old babbo got tired trying to crash the main entrance and went around to the side windows which fortunately were well screened. He strode back and forth trying to find a hole, all the while chattering and showing his teeth. Not being as familiar with

this sort of beast as my friends think, I couldn't tell whether he was grinning or whether he wanted to fight. It's a cinch our place would have been a shambles if he'd gotten in.

In due time babbo went away, disappointed. Once he returned and tried everything over again, then disappeared. Stan and I finished cleaning up and ventured outside, locking the solid door behind us. We found babbo near the entrance to the cabin of several of our colleagues who were napping and we got the devilish thought that it would be a fine thing to open the door and let our friend in to visit our unsuspecting pals.

Lady to the Rescue

But just then the wife of the hotel manager rushed out of her place with a broom and went after the baboon as if she meant it. Seems that he had been eating her flowers. Fun is fun, but not tearing up madame's flower beds. She took several hard whacks at babbo, just missing him, when up came a native boy from the government camp accompanied by a dog.

Then the fun began. The dog quickly started cornering the baboon, who seemed to be terrifically frightened. Both were making plenty of noise. In one wild leap the baboon landed in the arms of the native boy. When it comes to dogs, baboons apparently prefer the protection of humans. So amidst much chattering old babbo was taken back across the road to be leashed up.

Seems that he was a sort of pet, although he kept getting loose and into mischief. He was still young but plenty lively and, like all baboons, very destructive. This one was supposed to be captive, but we were in a part of the Congo infested with chimps and baboons and not too far from the gorilla country, so it would not have been surprising if he had decided to go native.

I would rate Epulu as one of the best stops on the safari. Not only is the rest camp attractive and good, but there is a government station used for training elephants and collecting wild animals, especially okapi. The okapi is a large, delicate four-legged animal with stripes on the legs something like those on zebras. It is found only in that area. It is estimated that there are about 15,000 left in the Congo but the number is believed to be declining. The Belgian government no longer sells okapi to zoos, but now gives them away when they think the delicate animals will be taken care of properly.

There were 59 okapi in captivity when we were there, but the open-air zoo is just like the natural environment. The government pays the natives for finding okapi but sends its own men to bring them to the depot when they're trapped. The official hunter at Epulu is Jean Medinah, a fine, colorful character who loves animals and is one of the world's great experts on wild life.

But perhaps the major attraction is the elephant. There is a road sign reading "Caution—Elephant Crossing" at the approach to the tiny settlement. A one-lane bridge crosses a picturesque river and nearby is an inlet of calm water where the elephants gather every afternoon for cooling off and horseplay. They're quite a sight having fun in the water. Some of them are trained to pull wagons and, if you like elephants, this is the place to see them at close range in natural environment.

Epulu is 40 miles from the nearest postoffice (they need one of their own) and 300 miles from the nearest supplies, yet the accommodations are quite good. It's the sort of place that merits more than a day if you have the time. The main hut has dirt floors but there's a small bar and the food, while plain, is quite good. There's electricity and hot water every evening.

Baboon tried to enter this cabin in Belgian Congo in which WWP was taking his ease.

Elephants taking afternoon dip in river at Epulu, elephant training center in equatorial forest.

(Photos by WWP)



VOODOO...AMERICAN STYLE



The supersonic McDonnell F101 "Voodoo" is typical of the high performance aircraft for which Servomechanisms, Inc. designs and produces Central Data Computers. These reliable subsystems measure physical factors, transduce this data to common form, produce corrected information, and compute desired input variables for all other systems in the aircraft.



The Wind Drift Computer, conceived by McDonnell engineers and developed jointly with Servomechanisms' is typical of our Mechatronics design philosophy, which assures maximum reliability as well as minimum down-time through pull-out, plug-in replacement of the individual packaged functions.



WESTERN DIVISION
Hawthorne, California

EASTERN DIVISION
Westbury, L.I., New York

MECHATROL DIVISION
Westbury, L.I., New York

MECHAPONENTS DIVISION
El Segundo, California

One in a series about users of Phillips 66 Aviation Products

Phillips 66
LOOKS AHEAD
with
UNITED



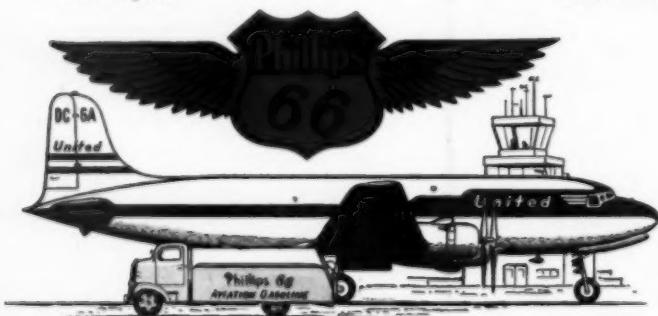
ACCENT ON SPEED; cruising speed of 300 miles an hour and quick loading through oversize main cabin door assure swift delivery of mail, freight, express.



HUGE MAIN CABIN has 4,433 cubic feet of space, more than 200 tie-down rings and is pressurized. Temperature control permits range of 40 to 70 degrees.



LARGE-SIZE OBJECTS, hitherto restricted from air shipment, fit easily into the spacious cabin of United's DC-6A. Cargo capacity is 30,000 pounds.



AVIATION DIVISION

PHILLIPS PETROLEUM COMPANY

BARTLESVILLE, OKLAHOMA

"We made a \$5,500,000 investment in the future of air freight." That is the statement of R. L. Mangold, manager of cargo sales, United Air Lines. Mr. Mangold referred to United's recent addition of five new DC-6As to its cargo fleet. This addition to its DC-4 Cargoliners will expand United's all-cargo productivity from 125,000 to 225,000 ton miles daily. The 5-mile-a-minute DC-6A cargo carriers will fly coast-to-coast in less than a half a day, including an en route stop; they will cut 6 hours westbound and 5½ hours eastbound from transcontinental flights.

● Today, Phillips 66 Aviation Gasoline gives dependable, efficient performance to United and other leading air lines, as well as to the military air services.

In step with the future, Phillips is a leading producer of super performance Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.